University of Birmingham

Biochemistry (Genetics) BSc (Hons)

Register for one of our Undergraduate Open Days (http://www.birmingham.ac.uk/undergraduate/visit/opendays/index.aspx) - Sep 12 & Oct 17

The point where chemistry, biology and medicine meet, biochemistry deals with the molecular nuts and bolts of living organisms and diseases. Advances in the biosciences are having a profound impact on our daily lives, from human health to conservation, making it a hugely rewarding area to study and work in. Biochemistry provides the foundation for many disciplines, including botany and zoology, genetics, surgery as well as anatomy, pharmacology and pathology, opening up huge potential for your future career path. Studying at Birmingham means you'll benefit from high-technology facilities and teaching from world-renowned experts in their field. You'll also be able to tailor your course to match your own interests and goals, and have the unprecedented opportunity to join one of our research groups, working on live research projects

2015 National Student Survey "97% of students said that they were satisfied with the teaching on our Biochemistry courses"

This programme has been accredited by the Royal Society of Biology. Accredited degree programmes contain a solid academic foundation in biological knowledge and key skills, and prepare graduates to address the needs of employers.

Royal Society of Biology
Accredited Degree

Course fact file

UCAS code: CC74

Duration: 3 years

Places Available: 230 (across all Biosciences programmes)

Applications in 2014: 1964

Typical Offer: AAA-AAB (**More detailed entry requirements and the international qualifications accepted can be found in the course details (?OpenSection=EntryRequirements)**)

Start date: September

Contact

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Web: **www.birmingham.ac.uk/biosciences (http://www.birmingham.ac.uk/biosciences)**

School of Biosciences (/schools/biosciences/index.aspx)

Details

This flexible degree programme offers you the opportunity to specialise in Genetics within the context of a broadly based, modular biochemistry degree course. We put a particular emphasis on practical training and developing transferable skills that will be invaluable in a wide range of professional settings. We are also proud to have been awarded formal Accreditation by the Society of Biology for our four-year MSci and 3-year BSc courses.

Why study this course

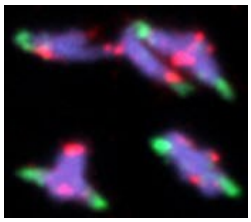
Biochemistry is a science subject at the interface between Biology, Chemistry and Medicine. If you are fascinated by the molecular world, and wish to pursue a career in an area with a direct and growing impact on key societal issues, Biochemistry is a great place to start.

The Biochemistry degree course, with its specialist degree options, offers a fantastic opportunity to explore living organisms from a molecular and cellular perspective. We start with the foundations of chemistry, cell biology and genetics and lead you right up to cutting-edge research questions in the final year.

With a Biochemistry degree, you will acquire a wide range of skills, with particular emphasis on data analysis, experimental design and problem solving. Skills acquired in this course enable careers not just in the life science, but across a wide range of professions. Most important of all, Biochemistry has many facets. Check out our collection of **related research stories (http://www.birmingham.ac.uk/schools/biosciences/research/showcase/explore.aspx)** .

2014 National Student Survey "97% of students said that overall they were satisfied with the quality of our Biochemistry courses"

Modules



Our modular course programme gives increasing flexibility in choosing modules that resonate with your interests. Following a first year where all modules are compulsory, you take a combination of compulsory and elective modules in the second year, while the final year includes only one compulsory module and a broad choice of elective modules covering areas as diverse as cancer biology, immunology, neurobiology and mechanisms of human disease.

For a description of modules see **Biochemistry Module Information (/schools/biosciences/courses/undergraduate/modules/biochemistry-modules.aspx)**. The modules described here are the ones that we currently offer and will give you a good idea of the range of subjects that we teach. However as our undergraduate teaching is research led and we constantly review our teaching to ensure that the modules that we offer are up to date there may be changes to module titles and content.

First Year

The first year offers a set of modules that explores the full spectrum of biochemistry, from the physiology of living organism to the molecular details of particular biochemical reactions and the enzymes that catalyse these reactions. A key element is the Chemistry module.

First year modules

Biochemistry (/undergraduate/courses/biosciences/ug-modules/Biochemistry.aspx) - Fundamental biochemical processes taking place inside cells

Cell Biology and Physiology (/undergraduate/courses/biosciences/ug-modules/Cell-Biology-and-Physiology.aspx) - Tissues, organelles, reproduction and development

Chemistry I (/undergraduate/courses/biosciences/ug-modules/Chemistry-for-Biochemists-1.aspx) - Inorganic and organic chemistry, including practical training.

Skills for Biosciences (/undergraduate/courses/biosciences/ug-modules/Skills-for-Biosciences.aspx) - Laboratory skills, transferable skills training including mathematics, IT, literature search and scientific writing.

Genetics I (/undergraduate/courses/biosciences/ug-modules/Genetics-1.aspx) - Storage of genetic information, gene expression and regulation, mitosis and meiosis, gene linkage and chromosome mapping.

Enzymes and Metabolism (/undergraduate/courses/biosciences/ug-modules/Enzymes-and-Metabolism.aspx) - Enzyme catalysis and regulation, metabolism of carbohydrates and vitamins, experimental techniques to study metabolic reactions.

Physical Biochemistry (/undergraduate/courses/biosciences/ug-modules/Physical-Biochemistry.aspx) - The fundamental laws governing biochemical reactions and how we can explore them experimentally.

Module Outside the Main Discipline (MOMD) - allows you to explore content from other academic programmes of this university in the form of a stand-alone module. **More information on MOMD can be found here (https://intranet.birmingham.ac.uk/as/registry/momd/index.aspx)**.

For more details on individual modules, follow the links or download a document with short module descriptions for the Biochemistry courses here: (link to Biochemistry module descriptions).

Nora Miroslavova, Biochemistry graduate "The modules were taught by expert members of staff involved in the research field, which I found very interesting and stimulating."

Second Year

The second year features a combination of core modules that all biochemistry students follow, and two elective modules, where you can start to define your personal direction in the field.

Second year modules

Core modules (taken by all students on the Biochemistry programme)

Proteins and Enzymes (/undergraduate/courses/biosciences/ug-modules/Proteins-and-Enzymes.aspx) – Protein structure and evolution, mechanisms of enzyme catalysis, techniques to determine protein structures.

Membranes, Energy and Metabolism (/undergraduate/courses/biosciences/ug-modules/Membranes-Energy-and-Metabolism.aspx) – Biological membranes and their role in energy metabolism, regulation of metabolism by hormones and other factors

Key module: Molecular Biology and its Applications (/undergraduate/courses/biosciences/ug-modules/Molecular-Biology-and-its-Applications.aspx) – Genetic analysis and gene cloning, DNA fingerprinting and forensics, genomics and computational approaches to genetics

Chemistry II (/undergraduate/courses/biosciences/ug-modules/Chemistry-for-Biochemists-2.aspx) - Spectroscopic techniques, synthesis of peptides, oligonucleotide and aromatic compounds, determining structures of simple organic molecules.

Communications and Skills in Biosciences (/undergraduate/courses/biosciences/ug-modules/Communication-and-Skills-in-Biosciences.aspx) – Science communication in writing and oral presentations, ethics in science, analysis of the scientific literature.

Choose two elective* modules from:

(*the key module highlighted below is recommended, but not compulsory for Genetics)

Key module: Genetics II (/undergraduate/courses/biosciences/ug-modules/Genetics-

2.aspx) – Organisation of genes and genomes, generation of genetic diversity, gene transmission and analysis of problems in transmission and molecular genetics.

Cell and Developmental Biology (/undergraduate/courses/biosciences/ug-modules/Cell-and-Developmental-Biology.aspx) - Development of multicellular organisms, interaction between cells and the cellular matrix, regulation of stem cell function.

Topics in Medical Biosciences (/undergraduate/courses/biosciences/ug-modules/Topics-in-Medical-Biosciences.aspx) – Neurobiology and neurotransmitters, pharmacology and anaesthetics, blood constituents and haemostasis, complement and immunity.

Microbes and Man (/undergraduate/courses/biosciences/ug-modules/Microbes-and-Man.aspx) – The impact of microbes on humans, bacteria, fungi and viruses, common themes of infectious disease mechanisms.

Final Year

The core component of the final year is the Project, which covers 40 of 120 final year credits. In dialogue with a lecturer or professor, you will do your own research and be led to independence as a biochemist. The Biochemistry programme also includes one core module focussing firmly on analytical skills. Finally, a diverse spectrum of elective modules allows you to explore individual facets of biochemistry according to your personal preference and interests.

You may choose between a laboratory project, a two-part library research or a computing-based project. Students choose their project from an extensive list near the end of their 2nd year. Some even arrange a project independently in collaboration with an academic member of staff. Whichever path you choose, you will find that the project is particular highlight of your academic training and experience.

Final year modules

Core content

Project

Experimental Design, Analysis and Interpretation of Biochemical Data (/undergraduate/courses/biosciences/ug-modules/Experimental-Design-Analysis-and-Interpretation-of-Biochemical-Data.aspx) – Lectures and practicals focussing on analysing data from biochemical experiments, from considering experimental design, to preparing reagents to composing an experimental report.

Choose three elective modules* from:

(**In order to be awarded the Genetics degree title you need to select at least two qualifying modules)

Modules qualifying for the Genetics degree

Genetics III (/undergraduate/courses/biosciences/ug-modules/Genetics-3.aspx) - Genetic variation in humans and model organisms, dynamics of chromosome organisation during mitosis and meiosis, genome instability.

Eukaryotic Gene Expression (/undergraduate/courses/biosciences/ug-modules/Eukaryotic-Gene-Expression.aspx) - Control of gene transcription, chromatin structure, pre-mRNA processing, mRNA translation and degradation.

Cancer Biology (/undergraduate/courses/biosciences/ug-modules/Cancer-Biology.aspx) – Regulation of cell division and aberrations in malignant tumours, genetic bases of tumourigenesis, programmed cell death.

Bacterial Gene Regulation (/undergraduate/courses/biosciences/ug-modules/Bacterial-Gene-Regulation.aspx) - How genes are switched on or off in response to external stimuli, how control of gene expression can be explored experimentally.

Other elective modules

Cellular Signalling (/undergraduate/courses/biosciences/ug-modules/Cellular-Signalling.aspx) - Signal transduction in and between cells, G-protein coupled receptors, phospholipid and Ca2+ signalling, ligand-gated ion channels and electrical responses.

Molecular Basis of Bacterial Infection (/undergraduate/courses/biosciences/ug-modules/Molecular-Basis-of-Bacterial-Infection.aspx) | **Watch video** (/undergraduate/courses/biosciences/module-bio305-molecular-basis-bacterial-infection.aspx) - Evolution of bacterial virulence, antibiotics and antibiotics resistance, genomic data in analysing pathogenicity.

Cellular Neurobiology (/undergraduate/courses/biosciences/ug-modules/Cellular-Neurobiology.aspx) | **Watch video** (/undergraduate/courses/biosciences/module-bio379-cellular-neurobiology.aspx) - Neuronal function and neural development, synaptic function, transmitter receptors and ion channels.

Molecular and Cellular Immunology (/undergraduate/courses/biosciences/ug-modules/Molecular-and-Cellular-Immunology.aspx) | **Watch video** (/undergraduate/courses/biosciences/module-bio388-molecular-cellular-immunology.aspx) - Evolution of the immune system, innate immunity, cell biology of immunity, structural basis of discrimination between self and non-self.

Structures of Destruction (/undergraduate/courses/biosciences/ug-modules/Structures-of-Destruction.aspx) - Bacterial and viral pathogens explored from the perspective of their molecular structures, protein misfolding and amyloid diseases.

Applied and Environmental Microbiology (/undergraduate/courses/biosciences/ug-modules/Applied-and-Environmental-Microbiology.aspx) - Microbial communities, how they compete, and behave socially.

Plant Sciences in the 21st Century (/undergraduate/courses/biosciences/ug-modules/Plant-Sciences-in-the-21st-Century.aspx) | **Watch video (/undergraduate/courses/biosciences/module-bio398-plant-science-21st-century.aspx)** - Plant growth and development in relation to food supply, biofuels and climate change. Research-based module with emphasis on analysis of the current research literature.

* Modules run either in Semester 1 or Semester 2. Particular combinations of modules may not be advisable, especially if all 3 choices were to run in the same semester.

Fees and funding

Standard fees (http://www.birmingham.ac.uk/students/ug/courses/fees/standard) apply
Learn more about **fees and funding (/undergraduate/fees/loans.aspx)**

Scholarships
Learn more about our **scholarships and awards (/undergraduate/fees/funding/index.aspx)**

Entry requirements

Number of A levels required: 3

Typical offer: AAA-AAB

Required subjects and grades: Chemistry A level and one other from Biology/Human Biology, Computer Science, Environmental Studies, Geography, Geology, ICT, Maths, Physics, Psychology or Sports Studies/PE. Five GCSEs at grade C (minimum) in Double Award/Integrated Science, English and Mathematics.

General Studies: We do not accept General Studies, Critical Thinking, Citizenship Studies, Applied Science, Communication and Culture, Critical Studies, Global Perspectives, Science in Society and World Development.

Additional information:

BTEC Level 3 Extended Diploma (Applied Science) is accepted only in combination with a science subject at GCE A2 level at grade B or better. Other qualifications are considered – learn more about **entry requirements (http://www.birmingham.ac.uk/students/ug/requirements)**

International students:

International Baccalaureate Diploma: minimum 32 points. 6, 6, 5 at HL to include Chemistry and one other science at HL. 5 points in each of SL English and Maths if not offered at GCSE or equivalent.

Please note that we have reviewed our policy on the IB Diploma for 2016 entry and our offers will now focus on performance in Higher Level subjects. For more information and details please read our **2016 IB Diploma requirements (http://www.birmingham.ac.uk/undergraduate/requirements/index.aspx)** .

Standard English language requirements apply
Learn more about **international entry requirements (http://www.birmingham.ac.uk/students/ug/requirements/international)**

Depending on your chosen course of study, you may also be interested in the Birmingham Foundation Academy, a specially structured programme for international students whose qualifications are not accepted for direct entry to UK universities. Further details can be found on the **foundation academy web pages (http://www.birmingham.ac.uk/students/foundation-academy/Pathways/index.aspx)** .

How to apply

Apply through UCAS at **www.ucas.com (http://www.ucas.com/)**
Learn more about **applying (http://www.birmingham.ac.uk/students/ug/courses/apply)**

Key Information Set (KIS)

Key Information Sets (KIS) are comparable sets of information about full- or part-time undergraduate courses and are designed to meet the information needs of prospective students.

All KIS information has been published on the Unistats website and can also be accessed via the small advert, or 'widget', below. On the **Unistats website (http://unistats.direct.gov.uk)** you are able to compare all the KIS data for each course with data for other courses.

The development of Key Information Sets (KIS) formed part of HEFCE's work to enhance the information that is available about higher education. They give you access to reliable and comparable information in order to help you make informed decisions about what and where to study.

The KIS contains information which prospective students have identified as useful, such as student satisfaction, graduate outcomes, learning and teaching activities, assessment methods, tuition fees and student finance, accommodation and professional accreditation.

Related links

Undergraduate courses - School of Biosciences - Study here for your Bsc degree (/schools/biosciences/courses/undergraduate/index.aspx)

Biochemistry MSci (Hons) (/undergraduate/courses/biosciences/biochemistry-msci.aspx)

Learning and teaching

As a Birmingham student you are part of an academic research elite and will learn from world-leading experts. From the outset you will be encouraged to become an independent thinker, discussing, analysing and evaluating various aspects of Biology in partnership with the staff who will be involved in every step of your learning.

- **Lectures** - Your learning will take place in a range of different settings, from scheduled teaching in lectures and small group tutorials, to self-study and peer group learning. As well as traditional whiteboard and pen, our lecture theatres are equipped with the latest technology including movies and animations, molecular graphics and 'ask the audience' style electronic voting systems. Student interaction with staff is encouraged before, during and after lectures particularly using social media.

- **Practical classes** - Laboratory-based practical work is an integral part of our degree. A typical practical session will last 3 hours allowing you to complete the work at your own pace. In addition to gaining important transferable skills, experience of practical work is essential if you wish to move into a research career and is valued by a wide range of employers. You will engage with academic and postgraduate researchers who will

help you during these practical sessions.

Take a virtual tour of one of our teaching labs (http://www.birmingham.ac.uk/schools/bioscience lab.aspx)

- **Tutorials** - A personal tutorial system is an essential feature of our degree programme and your tutors will help you in three important areas: supporting your academic progress, developing transferable skills and helping with any welfare issues. From the outset, you will be assigned your own Personal Tutor who will get to know you as you progress through your studies, providing academic and welfare advice, encouraging you and offering assistance in any areas you may feel you need extra support to make the most of your potential and your time here at Birmingham.
- **Project (final year)** - A core component of your final year is the project, which principally comes in two forms: as a laboratory-based project or as an extended dissertation. In both situations, a lecturer or professor will guide and advise you. But the principal aim is to lead you to independence as a future graduate in your field.

  You will join one of the research groups in the School for the laboratory-based project, and you will work on a topic or question that draws on current research activity. You will receive training in relevant lab techniques and you will have to document your work and its results in a thesis-like report.

  The dissertation project asks you to explore the research literature in a narrowly defined area of scholarship, with three aims: one, to write a comprehensive review of that area, two, to explore analyse a small set of articles in depth, and three, to develop a new research proposal from your review and in-depth analysis.

To begin with you may find university level education challenging, but we will support you to enable you to make this transition. You will have access to a comprehensive support system in the School, including personal tutors and welfare tutors, who can help with both academic and welfare issues throughout your course. You will have a formal transition review during your first year to check on your progress and identify areas where you may need some additional support, and the School's academic small group tutorial system will provide you with skills based support throughout the course.

Our **Academic Skills Centre (https://intranet.birmingham.ac.uk/as/libraryservices/asc/index.aspx)** also offers you support with your learning. The centre is a place where you can develop your mathematical, academic writing and general academic skills. It is the centre's aim to help you to become a more effective and independent learner through the use of a range of high-quality and appropriate learning support services. These range from one-to-one support with mathematics and statistics based problems from experienced mathematicians, to workshops on a range of topics including note talking, reading, writing and presentation skills.

Assessment methods

Studying at degree-level is likely to develop in different ways from your previous experience of learning and teaching. As well as remembering biochemical facts you will learn how to demonstrate real understanding as you apply your knowlege to analyse and evaluate scientific information. Our ulitmate aim is to help you develop into a skilled and creative biochemist. Each module is assessed separately and you will be assessed in a variety of different ways. All modules contain some continuous assessment, that is, assessment taking place during the teaching period. Continuous assessment generally accounts for over one-third of the mark for a given module, while the remainder are contributed by the end-of-year examination in the summer term. A subset of modules are assessed through course work, without an end-of-year examination.

At the beginning of each module, you'll be given information on how and when you'll be assessed for that particular programme of study. You'll receive feedback on each assessment within four weeks, so that you can learn from and build on what you have done. You'll be given feedback on any exams that you take; if you should fail an exam we will ensure that particularly detailed feedback is made available to enable you to learn for the future.

More information about assessment methods and feedback is given below:

- **Feedback** - Feedback - You will be able to track how your learning is developing by using a wide range of types of feedback. These include: written feedback on your scripts, formative tests (these do not count in your final degree mark), class feedback question sessions, discussions with each other and your tutor. .
- **Examinations** – The formal end-of-year examinations (in May/June of each year) are complemented by course work in the form of essays or reports, data handling or interpretation exercises, poster presentations, seminar presentations, group work and lab reports.
- **Projects and dissertations** – You will choose the topic of your project from a wide range of titles. We offer a range of projects including practical work in the laboratory, field work, computer based projects, or literature reviews. Projects allow you to demonstrate the full range of academic and transferable skills you have developed and provide a stepping stone to into research and other careers.

Employability

(/schools/biosciences/our-students/decombel-samantha.aspx)

Our graduates are ranked 3rd in graduate prospects - Complete University Guide 2016.

Graduates of the University of Birmingham are highly regarded among employers in the UK, and a Biochemistry degree from Birmingham is an excellent qualification for securing your future career in a diverse range of industries and employment sectors. Our graduates have done consistently well over the last several years, ranking in the top 5 of the Complete University Guide in terms of Graduate Prospects. Whether you have a clear idea of where your future aspirations lie or want to consider the broad range of opportunities available once you have a Birmingham degree, our Careers and Employability Service can help you achieve your goal

94.8% of our graduates are in employment or further study within six months of graduating 2013/14 Destination of Leavers from Higher Education survey

Advances in the biosciences are having a profound impact on our daily lives in areas from human health to conservation. Biotechnology, biological pharmaceuticals, and personalised medicine are key growth areas in the health sector. Over the next decade our increasing understanding of how genomes are regulated will revolutionise how we interact with the natural world. Environmental remediation, climate change and related themes pose multi-faceted challenges for the coming decades. Expert knowledge in biology and the life sciences will be in high demand for the foreseeable future, with excellent prospects for exciting and rewarding careers in research, education, media, industry, the NHS and the public sector.

A significant number of our graduates choose to take a further degree, a Masters or PhD. For many career paths, a further degree is an essential stepping-stone, including (but not limited to) careers in research. While many of our graduates remain in Birmingham and join one of our prestigious research groups, they are also highly sought after by universities around the world.

In order to help you build an attractive CV, bursaries from the University can help fund a summer internship in a research laboratory or in a company. Also, you can apply for one of the highly prestigious (and competitive) **Alumni Leadership Mentoring (http://www.birmingham.ac.uk/generic/internships/mentoring/almp.aspx)** or **Global Challenge programmes (http://www.birmingham.ac.uk/generic/internships/opportunities/globalchallenge/index.aspx)** of the University, which provide unique opportunities to see top notch organisations from an inside perspective. Furthermore, the Personal Skills Award (PSA) scheme gives formal recognition to skills you acquired outside the course, for instance when volunteering for a charity or taking on responsibility within the Guild of Students. We also offer 4-year course options (MSci, Professional Placement, Year Abroad) which are key to giving you a professional

edge in a highly competitive job market.

Helping you find the right career

The University and the School of Biosciences provide a range of services to support you in finding a career and to build a CV that stands out from the crowd. Our skills modules and tutorials develop your career skills and are fully integrated with Careers Network, the University's careers advice service. During term time, professional career advisers hold weekly drop-in sessions, discussing with you how to prepare a CV and cover letters, the graduate application process and how to explore possible career paths. Talks and presentations by external life sciences professionals are embedded in academic modules. These individuals are either Birmingham alumni or have professional links to the University, and you will learn about their career path and experience.

Our unique careers guidance service is tailored to your academic subject area. Our team source exclusive **work experience opportunities (http://www.birmingham.ac.uk/students/careers/work-experience.aspx)** to help you stand out amongst the competition, with **mentoring (http://www.birmingham.ac.uk/generic/internships/mentoring/index.aspx)** , **global internships (http://www.birmingham.ac.uk/generic/internships/index.aspx)** and placements available to you. Once you have a career in your sights, one-to-one support with CV's and job applications will help give you the edge. In addition, our employer-endorsed award-winning **Personal Skills Award (PSA) (http://www.birmingham.ac.uk/students/careers/psa.aspx)** recognises your extra-curricular activities, and provides an accredited employability programme designed to improve your career prospects.

Professional accreditation

This programme has been accredited by the Royal Society of Biology following an independent and rigorous assessment. Accredited degree programmes contain a solid academic foundation in biological knowledge and key skills, and prepare graduates to address the needs of employers. The accreditation criteria require evidence that graduates from accredited programmes meet defined sets of learning outcomes, including subject knowledge, technical ability and transferable skills.

Royal Society of Biology
Accredited Degree

99% Students agreed staff are good at explaining things

BSc (Hons) Biochemistry (Genetics)
Full time

To see more details and compare with other courses

Visit UNISTATS

Official data collected by HEFCE

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2014 Website of the Year