Department of Biomedical Science.

The biological basis of life, disease and new treatments.

www.sheffield.ac.uk/bms
Can we develop a regenerative medicine treatment from pluripotent stem cells to treat diseases such as Hirschsprung’s?

How can we regenerate sensory cells and their nerves to recover hearing and vision?

Can we understand how membrane and cytoskeletal dynamics regulate physiological processes at the cell and organism levels?

What can developmental biology teach us about disease, degeneration and decline?
The goals of biomedical science are easy to put down on paper: understanding disease, improving treatments, finding a cure. It’s about saving and improving lives, and it takes world class researchers who understand the intricate complexities of the human body. In Sheffield, these researchers are equipping the next generation of biologists for the medical challenges of the future.

Our staff are helping to solve deafness, muscular dystrophy and dementia. The three and four-year degrees we teach are amongst the few in the UK with an undergraduate anatomy module that includes human dissection. Our courses will ground you in the concepts and skills that underpin the discipline of biomedical science. After that, you can specialise in the areas that interest you most – where you can make the biggest difference.
Studying biomedical science

**Lectures**
A big part of University education, but far from the only part. Top academics will teach you essential concepts based on the latest medical studies and fundamental biological principles. It’s all backed up with online resources for you to use at home.

**Tutorials**
Your personal tutor is there to guide and support you through your degree. Regular one-on-one meetings can cover any topics you need help getting to grips with, and are a good place to start planning your next steps, during and after your degree.

**Laboratory work**
A good chunk of your time is spent in the lab. You’ll examine diseases from their basis in cells and genes, right up to whole body systems and human dissection. We have some of the best labs in the country for you to practice core scientific skills.

**Research projects**
You’ll start doing your own research as soon as you’re ready. There’s a mini project in first year, and a major part of your third year will be a 12 week research project based on your own chosen specialism. If you take our four-year MBiomedSci option, half of the final year is dedicated to a major piece of independent research.

As an experienced academic within biomedical science I run modules at levels two and three and teach across all levels. The majority of my teaching focuses on the role ion channels play both in normal physiology and disease. This links with my research interest in cystic fibrosis, a disease caused by mutations in a gene that makes an ion channel.

Like many academics in the department I use a variety of teaching methods in addition to the traditional lecture, including problem solving exercises, formative feedback assessments, online feedback quizzes and lecture capture. These approaches support and enhance the student experience for biomedical science students at Sheffield.

Students find our degree challenging, and we certainly make them work hard, but they reap the rewards of their hard work by graduating with a high quality, research-led and innovative degree from a world class university.

Dr Louise Robson
Director of Undergraduate Studies

Louise will teach physiology and pharmacology throughout your degree. She is one of four staff members in the department who have won one of the University’s Senate Awards for Excellence in Learning and Teaching and was awarded the 2017 Otto Hutter Teaching Prize, recognising her contribution to teaching undergraduate physiology. Louise has also been voted best lecturer by our students.
Lectures
Build an academic community with your coursemates as you learn key concepts.

Tutorials
Improve your skills with regular meetings and overcome any obstacles.

Laboratory work
Put the theory into practice and build up plenty of practical experience.

Research projects
Manage your own experiments, analyse results and solve scientific problems.

You can even spend a year abroad or work for a year in industry as part of your degree – turn to p8.
Our degree programmes

B900 BSc Biomedical Science (3 years)
B909 MBiomedSci Biomedical Science (4 years)

Individual cells, whole body systems and everything in between. There's plenty you can do on your Biomedical Science degree and we get right to it. Your first year covers a lot of preliminary ground that you'll return to, from cell biology and molecular biology, to physiology and pharmacology, to organ systems and neuroscience. You can also do modules from the other Sheffield biology departments, or elsewhere in the University.

You'll work at a more advanced level in your second year, choosing to specialise in areas such as physiology, pharmacology, neuroscience, developmental, cellular, and molecular biology. Our second year students also have the opportunity to select anatomy modules, completing supervised human dissection classes. During this year, you'll enhance and develop your skills in research, reviewing the scientific literature, analysing data and presenting your findings. All of our students also benefit from employability sessions and project work, equipping you with transferable skills for the future and at the end of your second year there are opportunities to study abroad or take a placement year.

In third year, it's over to you. We have a choice of four specialist routes, each with their own range of lecture and practical modules for you to pick from. There's also a 12-week research project for you to complete within your specialism, working closely with the expert academics in our internationally renowned research centres.

The four-year MBiomedSci course has an extra 12 months for you to do even more research. Half your time will be spent on an original in-depth research project, and lecture modules will cover areas including ethics and public awareness of science, geared towards a career as a scientific researcher. It's also your safest bet if you haven't decided between this and the BSc course.

cannot recommend the Biomedical Sciences course at the University of Sheffield highly enough. I knew instantly at the applicant's open day that it was the course and place for me. Not only is the department heavily involved in research, meaning the lectures are enthusiastic and the content is up to date, there is also a focus on other professions and transferable skills, which appealed to me.

Olivia Watkins
BSc Biomedical Science
Spend a year abroad

B901 BSc Biomedical Science with a Year Abroad (4 years)

Our Year Abroad programme means you can spend the third year of your degree in another country such as Australia, Canada, Hong Kong, India, New Zealand, the USA, Singapore or Korea. You’ll study biomedical science at a top international institution and learn from renowned researchers while getting to know another part of the world. You’ll have the freedom within your overseas programme to study subjects outside biology, so it’s also a chance to broaden your academic horizons.

The year abroad has been the best life changing decision I’ve made so far! It was so much more than just an experience, but it was a journey of discovering new cultures, flavours, languages and people that I would’ve never met if not for the programme.

Jowti Guillen
MBiomedSci Biomedical Science
Spend a year in industry

B902 BSc Biomedical Science with a Year in Industry (4 years)

B911 MBiomedSci Biomedical Science with a Year in Industry (5 years)

On the Year in Industry course, you’ll spend 12 months on work placement. These placements take place between your second and third year for BSc students, or your third and fourth year for MBiomedSci students. These placements cover both lab and non-lab based positions, putting your scientific skills into practice on commercial projects and include opportunities to work for large global companies such as GSK, AstraZeneca and Pfizer.

You’ll pay reduced fees for the year you’re on placement and most students earn salaries during their placements too. Placements aren’t guaranteed – it’s your responsibility to secure one but we’ll do everything we can to help.

Chris Turner,
BSc Biomedical Science with a Year in Industry as a Junior Brand Manager at Pfizer

I have had two fantastic years so far studying Biomedical Science at the University of Sheffield. It has been hard work, but great fun, and I’ve had so many amazing experiences. I am currently on a placement year as an analytical scientist at MSD, a pharmaceutical company in Hertfordshire. The Careers Service at the University was really helpful in helping me to find the placement, and they continue to provide support throughout the year.

Rachael Burnett
BSc Biomedical Science

The main skills that I gained during my placement year were interpersonal skills, organisational skills, and cross-functional engagement. Throughout the year, I worked with a wide range of individuals from across Europe which improved my interpersonal skills in a professional environment. I was also able to build up a greater understanding of a variety of areas in the business, such as medical and regulatory affairs, sales and logistics.

Chris Turner,
BSc Biomedical Science with a Year in Industry as a Junior Brand Manager at Pfizer
The optional Human Anatomy module in second year is one of the only opportunities in the UK for undergraduate students to perform a supervised human dissection. We also have a forensic anatomy module in third year, overseen by anatomy tutor Professor Katherine Linehan, who has won two of the University’s Senate Awards for Excellence in Learning and Teaching.

We are one of only a few universities in the UK to offer undergraduate students the opportunity to perform cadaveric dissection. Dissection classes at level two cover the location and relationship of structures within the thorax, limbs, abdomen, pelvis and head. At level three students have the unique opportunity to apply their level two anatomical knowledge in the field of forensic science.

In this new and innovative module students determine the identity of and cause of death of an individual’s human remains. During the course students are trained in facial reconstruction, forensic anthropology, DNA fingerprinting and weapons analysis by staff experts in human anatomy and forensic archaeology, and also by partnering organisations who work solving homicide cases on a daily basis.

The practical classes and lectures are supported by a collection of interactive online teaching resources that use cutting edge technology to guide the students step-by-step through the application of forensic techniques. They also allow the students to monitor their individual progress and gain feedback throughout the course via their mobile phone or tablet.

Professor Katherine Linehan
Senior Lecturer

At Sheffield, the biomedical science course centres around the mechanisms of human diseases, with the majority of lecture contents linking to how diseases arise when a specific mechanism in an organism goes wrong. I am grateful for the highly integrated practical classes, allowing me to practice the laboratory techniques and theoretical knowledge explored in lectures.

Jinheng Lin
BSc Biomedical Science

*The boxes of evidence used on this course are fabricated case studies and contain resin casts of anatomical structure of known individuals along with fictitious supporting materials such as dental records and DNA profiles.
Specialist routes

In your second year you’ll cover the core aspects of physiology, pharmacology, cell and molecular biology, and developmental biology, and enhance your employability skills with project work. You can then choose to specialise in physiology or cell and developmental biology, covering areas such as neurodevelopment, stem cells and cancer, the cardiovascular system and neurophysiology.

In your third year you’ll be able to select from four specialist pathways which contain core lecture and practical modules, or you can choose to swap your core practical module and study Forensic Anatomy instead.

Developmental and cellular biology
Focus on how the human body develops, and the role that cellular and molecular mechanisms play in this process. Study in detail how cells communicate with each other, and the regulation of gene expression.

Stem cell and cancer
Study the cellular and molecular mechanisms that underlie how cancer develops and examine the processes that determine how stem cells can be transformed for use in treating disease.

Neuroscience
Examine the human nervous system, including the parts that genes and proteins play in how neurons grow and are assigned roles in the body. The biological basis of brain disease is also covered in the neurodegeneration module.

Physiology and pharmacology
Learn how organs work together to create a fully functioning organism, and how medicines fix problems in the human body. Learn pharmacological techniques in practical classes, and study cancers and neurodegenerative illnesses.
Your journey through your degree will equip you with specialist knowledge and understanding, and enhance your graduate skills.
Research-led teaching

Studying in a research-led university means you’ll be exposed to the most up-to-date knowledge and techniques in biomedicine from day one. You’ll be taught by internationally renowned academic staff who are researching across a diverse range of biomedical areas such as cell biology, cancer, development and disease, neuroscience and stem cell and regenerative medicine. The research taking place in the department is embedded into all of our learning and teaching activities, whether it’s delivering a lecture on current developments, training you up in analysing experimental data or supervising you on your own research project.

Development and disease

They might not know it, but thousands of tiny fish and fruit flies have been at the centre of huge medical breakthroughs. We share a lot more with these, and other little beasts, than we used to think. Our lifecourse biology researchers in the Bateson Centre study a wide range of organisms, from invertebrates to mammals. Their aim is to understand how our bodies change throughout life - how we develop, grow and age. Sadly, most of us will eventually decline, degenerate or succumb to disease, and our researchers are getting a real feel for how this happens. They have helped to unlock new information about many illnesses, ranging from cancer and Parkinson’s disease to obesity and epilepsy.

The way we look at it, your body is a fabulously integrated system, in which billions of cells have to work together. We will teach you to think about the body in this way, and to understand the role of molecules, cells and tissues in building the body, in its healthy ageing and in its decline. You’ll end up with an enormous appreciation for how robust you are: your body is set up to survive, and to restore and remodel itself throughout life. You will also learn how a host of factors, from infection and injury to stress and bad luck, hijack your body’s systems to trigger disease and decline.

You’ll be taught by leaders in cell and developmental biology, stem cell biology, innate immunology, imaging/image analysis and mathematical modelling. There’ll also be guest lectures from medical consultants who work side-by-side with us in the Bateson Centre. You’ll learn how our skilled researchers have put their expertise to use in pre-clinical drug developments, including new drugs for epilepsy, inflammation and Parkinson’s disease.

In my lab we are using ‘targeted nuclease’ technology, which is basically a genomic scalpel that can be used to precisely modify the DNA of cells. Just recently, Great Ormond Street Hospital in London used this technology to treat a baby girl suffering from incurable blood cancer.

Undergraduates who do their third year research projects in my lab are trained to use targeted nuclease technology to create a zebrafish line that is deficient in the Glucocorticoid receptor, a very important anti-inflammatory signal. Mutants in this gene will allow us to understand how this signal is integrated with other ‘alarm’ signals in vertebrates’ bodies.

Dr Freek van Eeden
Senior lecturer

Freek is a researcher in our Bateson Centre, where he uses zebrafish as a genetic tool to study development and disease. He lectures on Modelling Human Disease and Dysfunction and co-ordinates our third year research projects module.
Cell biology and cancer

The endoskeleton is just one of the skeletons that humans need to survive. Membrane dynamics researchers spend a lot of time studying the cytoskeleton, which is made of protein and found inside individual cells.

The cytoskeleton gives cells their shape, and it has an important role to play in lots of biological processes: cell division, cell migration and membrane trafficking, for example. Because of these fundamental functions, defects in the cytoskeleton can lead to many illnesses including cancer, diabetes, heart disease, neurodegeneration and muscular dystrophy.

Our membrane dynamics researchers focus on the part the cytoskeleton plays in moving material around cells. They look at the process of endocytosis, which cells use to bring in material from the outside, and exocytosis, which is how cells force material out. They also look at the cytoskeleton’s relationship with cell membranes and synapses in the nervous system.

To do this, our researchers examine cells and tissues in isolation, and use departmental expertise in studying fruit fly and zebrafish model systems to apply the latest screening technologies and computational models.

I n my lab we study the process of endocytosis whereby cells ingest material from their environment. Sometimes this material consists of signals from neighbouring cells which determines whether the cells may move, differentiate or undergo programmed cell death. Our long term goal is to translate our findings into 3D systems and, ultimately whole organisms, to understand the relationship between endocytosis and cell signalling.

Professor Elizabeth Smythe
Professor of Molecular Cell Biology

Elizabeth is Director of our Centre for Membrane Interactions and Dynamics. She contributes to a first year module in cell biology and co-ordinates a membrane trafficking module at Level Three. She also co-ordinates third year practical cell biology classes, where students collect, interpret and present their own biological data. She supervises research projects where undergraduates can explore and execute research at first hand.
Neuroscience

Sensory systems sit behind every aspect of how we think and feel. Networks of nerves that stretch from our brains to our eyes, ears and fingertips are the pipelines that allow us to take in information from the outside world.

But the outside world is variable and dynamic – it’s forever changing. Our environment is made up of matter and energy that’s in a constant state of flux. So how can an animal with its own biological limitations make estimations of external information and interpret the world in a reliable way?

The answer may be in the variability of animals’ own sensory systems. New results from our sensory neuroscience researchers suggest that this variability makes it possible for organisms to evolve efficient ways of handling the complexity of the outside world, rather than becoming overwhelmed by it.

This means that sensory systems can take robust and reliable samples of information to be processed in an animal’s nervous tissue. So instead of adding to the confusion, a changing sensory system actually becomes a way of interpreting the world better.

My laboratory aims to discover how inner hair cells are able to accurately encode sounds over a wide frequency and intensity range, and how the information is processed on its way to the brain. Knowledge of how the ear processes sound will help us develop improved hearing aids, including cochlear implants. I am also looking to define, in collaboration with Professor Marcelo Rivolta, how stem cells are able to replace damaged nerve fibres in order to restore hearing.

Dr Stuart Johnson
Royal Society University Research Fellow

Stuart studies how cochlear hair cells convert sound vibrations into an electrical signal that can be interpreted by the brain.
Stem cell and regenerative medicine

More than 10 million people in the UK have some form of hearing impairment. Advances in technology have made hearing aids more effective than ever, but researchers in our Centre for Stem Cell Biology have been investigating what causes hearing loss in the first place. For example, Professor Marcelo Rivolta has been developing a treatment for auditory neuropathy, a common form of deafness caused by damage to the cochlear nerve.

Marcelo’s team converted human embryonic stem cells into cells similar to spiral ganglion neurons – the nerve cells which pass sounds into the brain. They then delicately injected them into the inner ears of deaf gerbils who, on average, recovered 46 per cent of their hearing for around four weeks.

This was the first time transplanted cells been successfully used to restore hearing in animals. The equivalent improvement in humans would be a shift from being unable to hear traffic to hearing a conversation.

Marcelo said: “We now have a method to produce human cochlear sensory cells that we could use to develop new drugs and treatments, and to study the function of genes. And more importantly, we have proof of the concept that human stem cells could be used to repair the damaged ear.”

Work in my laboratory aims to develop regenerative therapies for deafness and hearing loss using stem cells. Our research program includes a very broad range of interests and experimental techniques, spanning from the molecular and single-cell level to the use of animal models of hearing and deafness.

This exciting science underpins and feeds into my teaching for the biomedical science degree. In Level 2, for instance, I run the audiology practicals. Students learn about the different types of hearing loss and how to perform tests to measure auditory function. These are illustrated with real life examples and conditions that health professionals may see in their routine practice.

Professor Marcelo Rivolta
Professor of Sensory Stem Cell Biology

Marcelo works in our Centre for Stem Cell Biology on finding ways to regenerate a damaged inner ear. He lectures on how stem cells can be used in healthcare as well as running the practical sessions on audiology.
After your degree

Our graduates go on to make a difference in all sorts of ways. Many of them use their scientific skills and specialist knowledge to work in biomedical research, biotechnology or the pharmaceutical industry. Some do a PhD, or go on to study medicine, dentistry or veterinary science.

There are lots of other doors that a degree from a World Top 100 University can open for you too, and our dedicated Careers Service can help you find the right path.

All of my friends on my course are pursuing very different paths, because we all learnt the same core skills but can apply them to our own separate interests. One wants to work in public health, one in an IVF lab, another as a researcher in oncology, just to name a few different examples.

Personally, I discovered an interest in neurology, so I am currently on a clinical neurology MSc with plans to go into a clinical PhD, and eventually be a clinical psychologist running my own research, utilising the organisation, independence and lateral thinking skills learnt in my undergraduate degree.

Louise Moeller
From BSc Biomedical Science to postgraduate study in Clinical Neurology.

The role of a Clinical Research Associate is to manage relationships, data, communication routes and oversee the running of a clinical trial at an investigative research site. The position is fascinating for anyone interested in the drug development process. The clinical trial is the last step before a drug can be marketed and is arguably the most important, as this is where the safety and tolerability of a drug is tested in humans.

My three years in Sheffield were influential in teaching me not only the basic skills of the course, but also the time management and interpersonal skills that I rely on every day in my job.

Joshua Cheal
From BSc Biomedical Science to Senior Clinical Research Associate at IQVIA

86% of 2017 graduates in graduate-level employment or graduate-level further study six months after graduation.
I am now working as an Epidemiology Scientist sitting across the NHS Blood and Transplant Unit and Public Health England. My role focuses on infectious diseases transmitted via blood transfusions and tissue/organ transplants and involves: managing surveillance, writing reports, and feeding into government policy on the topic. My time in Sheffield really helped me get here, with my degree in Biomedical Science providing a solid basis in health science and the scientific process, which has aided me in my career and education since.

Joe Flannagan
From BSc Biomedical Science to Epidemiology Scientist, NHS Blood and Transplant

Where our graduates go

Further study
PhD, Masters, Medicine, Dentistry, Nursing, Teaching, Physiotherapy

15% Bioscience industry
Pharmaceutical Research, Sales Management, Drug Development, Toxicology, Clinical Trials

15% NHS
Clinical Scientist, Biomedical Scientist, Management, Healthcare Worker, Physician Associate

30% Jobs outside the field
Accountancy, Law, Marketing, Management, Publishing, Finance, Government

Destination of Leavers from Higher Education survey 2012–2017
Life in Sheffield

Sheffield’s got it all: groundbreaking annual festivals, galleries with links to the Tate and the V&A, a world-famous theatre scene and the biggest indie cinema outside London. More than a third of the city is inside the Peak District National Park.

It’s a green, friendly and affordable place where you’ll find incredible bars, restaurants, clubs and sports facilities, both on and off campus.

Students' union

Our students’ union has a thriving nightlife, countless cultural events and hundreds of student societies. Many of our students join the departmental society, BMS Soc.

When it comes to student support, our award-winning Student Services Information Desk is the first place to go for help, advice and information throughout your time at Sheffield.

Accommodation

University accommodation is another great place to meet new friends when you arrive. We offer a quality range of room types, affordable rents and three fantastic locations to choose from. All in walking distance from campus.

Your accommodation includes your bills, free internet and contents insurance. You’ll also benefit from Residence Life events, sports activities and support from our Residence Mentors.

International students

At Sheffield, you’ll mix with staff and students from all over the world – sharing ideas and making them happen.

We offer lots of support for international students. You can be picked up at Manchester Airport when you arrive and once you’re here, we run a range of activities to help you get to know the city, the university, and other students, including a dedicated Orientation Week.

The University's Student Services Information Desk can help you with any academic, financial, personal, or social issues, with specially trained immigration advisers.

www.sheffield.ac.uk/international

The best students’ union in the UK for ten years

2009–2018 Times Higher Education Student Experience Survey

University accommodation voted top five in the UK five years in a row

Times Higher Education Student Experience Survey 2014-2018
A Levels – Two of the three A Levels should be in Biology or Human Biology, Chemistry, Physics, Maths or Further Maths, Geography or Psychology

- B900 BSc Biomedical Science (3 years): AAB
- B901 BSc Biomedical Science with a Year Abroad (4 years): AAA
- B902 Biomedical Science with a Year in Industry (4 years): AAB
- B909 MBiomedSci Biomedical Science (4 years): AAA
- B911 MBiomedSci Biomedical Science with a Year in Industry (5 years): AAA

International Baccalaureate

- B900 BSc Biomedical Science (3 years): 35 points
- B901 Biomedical Science with a Year Abroad (4 years): 37 points
- B902 Biomedical Science with a Year in Industry (4 years): 35 points
- B909 MBiomedSci Biomedical Science (4 years): 37 points
- B911 MBiomedSci Biomedical Science with a Year in Industry (5 years): 37 points

The University of Sheffield also accepts a range of other qualifications. Details are given on the University website at www.sheffield.ac.uk/undergraduate/apply/international-qualifications

Biosciences at Sheffield

Discoveries in bioscience can save and improve lives all over the world. Here at Sheffield, our courses cover the full breadth of biology: from molecules and cells, right up to human anatomy and global ecosystems.

To explore our full range of courses in bioscience at Sheffield, visit the website: www.sheffield.ac.uk/biosciences

International students

If you don’t meet our entry requirements, our International College offers an International Foundation Year in Science and Engineering. The programme is designed to develop your academic level in your chosen subject, introduce you to the study skills that will be vital to success and help with language if you need it.

www.usic.sheffield.ac.uk

Tuition fees

Tuition fees for UK, European Union and international students are given on the University of Sheffield’s webpages for undergraduates here: www.sheffield.ac.uk/registration/tuitionfees

Information for disabled students

Specific information for disabled students can be found on our website: www.sheffield.ac.uk/study/policies/disabled-applicants

Biosciences Foundation Year

We offer a foundation year for students who want to study biosciences, but don’t meet the entry requirements to go straight into first year. So if you’ve studied the right subjects but haven’t achieved high enough grades, or you’ve achieved good grades in unrelated subjects, this could be the route for you. After successfully completing the one-year programme, you’ll progress onto the first year of your chosen degree.

Visit www.sheffield.ac.uk/sefy for more information and entry requirements.

Mature students

You can apply directly for Biomedical Science with a Foundation Year through the University’s Department for Lifelong Learning if you don’t meet our direct entry requirements.

www.sheffield.ac.uk/dll
Any questions?

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The content of our courses is reviewed annually to make sure it’s up-to-date and relevant. Individual modules are occasionally updated or withdrawn. This is in response to discoveries through our world-leading research; funding changes; professional accreditation requirements; student or employer feedback; outcomes of reviews; and variations in staff or student numbers. In the event of any change we’ll consult and inform students in good time and take reasonable steps to minimise disruption.

We timetable teaching across the whole of our campus, the details of which can be found on our campus map. Teaching may take place in a student’s home department, but may also be timetabled to take place within other departments or central teaching space.

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