School of Biosciences
Undergraduate
Degree Programmes
Entry 2018  www.cardiff.ac.uk/biosciences
Insider Information – Find out more...
Want to know what life at Cardiff is really like?
Our insiders are real students studying a range of subjects. You can read their blogs, post comments and message them on Facebook and Twitter.
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Discover the **Cardiff Experience**

**A leading university . . .**

- You’ll be part of a Russell Group university - one of the UK’s world-class universities.
- You can choose from more than 350 degree programmes. The Cardiff University degree is known and respected worldwide with a substantial number accredited by the professions and other external bodies.
- You’ll benefit from outstanding teaching in a research-led environment - Cardiff is ranked in the UK’s top 5 universities for research quality.
- Staff include a Nobel Laureate and numerous Fellows of the Royal Society and other prestigious institutions.

**in an outstanding city . . .**

- You’ll live in a friendly, compact and safe city with all your study, living and leisure needs within walking distance.
- Your money will go further at Cardiff with capital city attractions at provincial prices - Cardiff is amongst the most affordable/cost effective student destinations in the UK.¹

**with able and motivated students . . .**

- You’ll be at a first choice university where demand for places is strong.
- You’ll be studying in an environment with able and motivated students who have high grades at A-level or equivalent.
- You’ll be at an international university with students from more than 100 countries who have excellent career prospects.

**who have excellent career prospects.**

- You can be confident of your future prospects - 95% of our students were employed or had entered further study within six months of completing their studies.²
- You’ll be in demand - Cardiff is among the top 25 universities targeted by employers seeking high calibre graduates.³

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**Notes**

1. Research by Natwest 2017
2. HESA Destination of Leavers Survey 2016
3. High Fliers Research The Graduate Market 2017

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**Contact us**

For students from the UK and EU:
Tel: 029 2087 4455
Email: enquiry@cardiff.ac.uk

For students from the rest of the world:
Tel: +44 (0)29 2087 4432
Email: international@cardiff.ac.uk
Welcome

Thank you for your interest in the School of Biosciences. This brochure has been produced by our admissions tutors to give you accurate and up-to-date information about our undergraduate courses.

The world is facing both continuing population growth and an ageing population that, together, place ever-increasing demands on healthcare and global resources. At the same time, climate change is impacting on both ecosystems and agricultural productivity.

Biosciences have a crucial role to play in developing solutions to these challenges. From new approaches to the repair of degeneration in the ageing or diseased brain, to ensuring a sustainable supply of fresh water; from the regeneration of the tropical forest habitat of orang-utans, to gaining new insights into the molecular mechanisms of cancer; these and many more challenges are being met through study and research.

Our goal is to equip graduates with the knowledge, tools and understanding to contribute to helping find solutions to these complex challenges of our time.

We have an exciting range of Honours and integrated Masters’ Degrees on offer, all of which have strong relevance to modern society, and will provide you with well-respected qualifications from which you can develop satisfying and rewarding careers.

If you should decide to study at the School of Biosciences, you can be sure that my staff and I are dedicated to providing you with the excellent tuition and friendly, supportive atmosphere which have become the Cardiff hallmark.

Professor Jim Murray
Director of School

This brochure will provide you with more details of our programmes. We hope that they will give you more than just a flavour of what we have to offer you. However, we are always ready to answer any questions you may have, by post, telephone or email, or when you come to Cardiff for a visit. You will find the appropriate contacts at the end of this brochure.

Important Legal Information

The contents of this brochure relate to the Entry 2018 admissions cycle and are correct at the time of going to press in October 2017. However, there is a lengthy period of time between printing this brochure and applications being made to, and processed by us, so please check our website [www.cardiff.ac.uk] before making an application in case there are any changes to the course you are interested in or to other facilities and services described here. Where there is a difference between the contents of this brochure and our website, the contents of the website take precedence and represent the basis on which we intend to deliver our services to you.

Any offer of a place to study at Cardiff University is subject to terms and conditions, which can be found on our website [www.cardiff.ac.uk/offerterms] and which you are advised to read before making an application. The terms and conditions set out, for example, when we might make changes to your chosen course or to student regulations. It is therefore important you read them, and understand them.

If you are not able to access information online please contact us:
Email: enquiry@cardiff.ac.uk
Tel: 029 2087 4455

Your degree: Students admitted to Cardiff University study for a Cardiff University degree.
Cardiff: A capital city

The Principality (Millennium) Stadium nestles in the heart of the city, and is home to numerous sporting events and concerts throughout the year.
Cardiff is a thriving and attractive city, which is widely recognised as an outstanding place in which to live and study. It combines all the advantages of a compact, friendly and inexpensive location, with the cultural and recreational facilities of a modern capital city.

Cardiff offers everything from the excitement of the city to the peace and tranquility of the nearby coast and countryside. With its distinctive character, good quality of life, and growing national and international reputation, it hosts many high-profile cultural and sporting events, including international rugby, soccer, cricket and motor sport.

When it comes to entertainment, Cardiff is well-equipped to satisfy student needs. There is a multitude of cafés, pubs and nightclubs. The city is home to the world-renowned Welsh National Opera, it boasts prestigious concert venues such as the Wales Millennium Centre, St David’s Hall and the Motorpoint Arena, as well as the iconic Principality Stadium, the National Museum Wales, several theatres and the historic Cardiff Castle.

Cardiff is the location for award-winning television productions, including Doctor Who, Sherlock, Torchwood and Casualty.

The city is one of the UK’s best shopping destinations, with St David’s Dewi Sant retail centre standing alongside pedestrianised shopping streets, indoor and outdoor markets, and a fascinating network of glass-canopied Victorian and Edwardian arcades.

Cardiff also has more urban green space than any other UK city, and offers easy access to the countryside, coast and mountains.

Lively, elegant, confident, cosmopolitan and ambitious are all words readily used to describe modern-day Cardiff. Together, the city and the University provide students with the ‘Cardiff Experience’, a lifestyle our students remember long after graduation.

**Don’t just take our word for it . . .**

“Cardiff is one of Europe’s youngest capital cities – small enough to be friendly and big enough to offer the best of living in a major city.”

The Complete University Guide 2017

Come and see for yourself . . .

Cardiff benefits from excellent road and rail links with Britain’s other major towns and cities. London, for example, is two hours by train, and the M4 links both the West and South of England, as well as West Wales. Travel to the Midlands and to the North is equally convenient. The journey by road from Birmingham, for example, takes only two hours. The main coach and railway stations are both centrally placed, and Cardiff also benefits from an international airport.

“Cardiff seems to have it all: grand civic architecture in a breezy waterside location, super-smart city bars and venues just a short hop from lovely countryside.”

Guardian University Guide 2016

The surrounding countryside and coast offer superb opportunities for outdoor pursuits

Cardiff is one of the UK’s best shopping destinations

Wales Millennium Centre is a world-class venue for the arts
Cardiff University has an international reputation for excellence in teaching and research, built on a history of service and achievement since 1883, and recognised by our membership of the Russell Group of leading research-led universities.

With attractive and compact campuses, excellent student accommodation, and a hugely popular Students’ Union, all within easy walking distance of each other in a thriving city, it is not surprising that Cardiff is a first choice university for many.

We admit approximately 5,000 undergraduate entrants each year, the majority of whom are school and college leavers, and have high grades at A-level or equivalent. While competition for entry is strong, Cardiff is an inclusive university with a good record on widening participation and fair access, and we welcome applications, irrespective of background, from everyone with the potential to succeed at Cardiff University.

The University’s Cathays Park Campus is located in and around the impressive Portland stone buildings, parks and wide tree-lined avenues that form Cardiff’s attractive civic centre. The majority of academic schools are located here - just a few minutes’ walk from the city centre. The three academic schools offering healthcare courses (excluding Optometry and Pharmacy) are based at the Heath Park Campus, approximately one mile away, which is also home to the University Hospital of Wales.

Although dating from 1883, Cardiff is focused on the 21st century, and has modern state-of-the-art buildings and facilities. The University has invested substantially in its estate in recent years and continues to do so today. Most academic schools have benefited from major refurbishment, including new and well-equipped laboratories, lecture theatres, libraries and computing facilities. International opportunities are available via our Global Opportunity Centre. These include study, work and volunteering placements in 27 EU countries as well as international exchange opportunities. All students also have the opportunity to study a language, in addition to their degree, through the University’s Languages For All programme.

The University takes its environmental, safety and security responsibilities very seriously. It has comprehensive policies in place which are making great savings in energy consumption and, to support the safety and security of all members of the University community and their property, there is 24-hour security cover throughout the campus.

What the Guides say...

“The University is as confident and forward-looking as the city it’s located in, and has an excellent reputation for the quality of its teaching and research.”

Guardian University Guide 2016

Cardiff University is among the best in the UK for preparing graduates for the workplace.

Times Higher Education – Global University Employability Ranking 2016

Cardiff offers one of the best student experiences in Wales, according to the latest Times higher Education UK Student Experience Survey.
Living in Cardiff
As a fast developing capital city, Cardiff is a great place to be a student. It’s large enough to offer you an exciting variety of activities and entertainment, but small enough for you to feel comfortable in.

Accommodation
Cardiff offers guaranteed University accommodation of good quality and value, and a range of residences to suit individual preferences and budgets.

All undergraduates who accept their offer of a place from Cardiff, on a firm basis, are guaranteed a single occupancy place in University residences during their first year of study.

Please see our website for full details of our accommodation guarantee and associated deadlines: www.cardiff.ac.uk/residences

The University is continually investing in its student residences, and the views of students are taken into account at the design stage. Unusually for a civic university, most of our residences are within easy walking distance of lecture theatres, libraries, laboratories, the Students’ Union and city centre.

There are 15 different residences, providing more than 5,500 study bedrooms and students can apply for the residences which best suit their preferences, interests and budgets. Some 70% have en-suite shower and toilet facilities and all halls of residence have computer network connection points and access to Wi-Fi.

Fees depend on the facilities included and whether catered, part-catered or self-catered, but prices compare very favourably with those of other UK universities. Besides managing University property, the Residences Office maintains close links with the private sector and provides assistance to students seeking to rent or share houses or flats.

Student Life
The Students’ Union
Cardiff Students’ Union is one of the biggest, best and most active in Britain. A multi-million pound investment has been made in Union facilities in recent years, which has included a new venue called Y Plas, which at night becomes a nightclub.

Hosting live music, club nights, stand-up comedy, fashion shows and awards ceremonies, there’s lots to keep you entertained from your first day to your last.

Other facilities include a food court, a bank, a print shop, a hair salon and a bookshop. The Lounge offers IT and Skyping facilities, meeting rooms and a “chill-out” area, as well as snooker tables and multi-faith prayer room. The Union also has its own letting agency and an Advice and Representation Centre. In addition, it is home to CU TV and Xpress Radio (the students’ own TV and radio stations) and more than 200 cultural, political, religious, social, sporting societies and clubs.

Jobshop
Jobshop is the Union’s own student employment service and provides casual, clerical and catering jobs around the University to hundreds of students.

What the Guides say . . .
“Cardiff is one of the best UK cities for young adults because of its low cost of living, good job opportunities and decent wages.”
The Complete University Guide 2017

“Cardiff is amongst the most affordable/cost effective student destinations in the UK.”
Research by NatWest 2017

“Cardiff has one of the biggest, best and most active students’ unions in the UK and is currently benefitting from a multi-million pound investment.”
The Complete University Guide 2017
School of Biosciences

Cardiff University’s large and successful School of Biosciences has an international reputation for its teaching and research, and offers one of the top research-driven bioscience curricula in the UK. The School also benefits from being located in the magnificent setting of Cathays Park, just a few minutes’ walk from Cardiff’s lively and modern city centre.

Cardiff University School of Biosciences offers a dynamic and flexible curriculum which spans the full spectrum of our academic interests in biological, biomedical and biochemical sciences.

The School has well-equipped modern laboratories, its own libraries, study areas with networked computers, and a brand new e-learning facility. We also run a field centre in Sabah, Malaysia.

We take in around 400 science undergraduates each year and, although the School is large, with a total undergraduate student population of more than 1,200, it is not impersonal. Every student is allocated a personal tutor whom they meet regularly, and staff and students can interact constructively through staff-student panels. Students can also join subject-related societies, which organise both academic and social events, and are a great way of getting to know your fellow students.

The School has over 250 academic and research staff, including more than 30 professors, who are internationally renowned in their area of study.

In the most recent national assessment, 98% of our submitted research was rated at least of international standard with 84% classed as “internationally excellent” or “world-leading”.

Degrees in Biosciences

We offer four single honours degrees in Biological Sciences, Biochemistry, Biomedical Sciences and Neuroscience. You also have the option of graduating with a degree title that indicates a particular specialism (see page 27), such as Biological Sciences (Genetics), Biological Sciences (Zoology), Biomedical Sciences (Anatomy) and Biomedical Sciences (Physiology). Your final degree title will depend on module selection in the second and final year.

Our courses are aligned with the School’s research strengths, ensuring that your learning is informed by research leaders who are specialists in their fields.

All of our courses can be taken as four-year sandwich programmes with a year spent in professional training (see page 12), or as four-year integrated Masters’ degrees (see page 17).

Our broad Year 1 curriculum gives you a firm foundation in all the biological disciplines, and essential related subjects, ensuring that all students are equally-well prepared for subsequent studies in the second and final years.

Decisions around specialisation are made later in the degree course, helping you to choose a discipline that fits your interests, academic strengths and career aspirations.

This approach is supported by pathway guidance, ensuring that you receive a high-quality, tailored experience with student choice at the core.

Our degrees are closely linked to the research interests of the staff who teach them, allowing you to experience the excitement of learning in an active research environment. We attract substantial external research funding and this will allow you to make use of the latest equipment, techniques and facilities in your project work.

Teaching Excellence

In the 2017 National Student Survey, 95% of our students found their course to be intellectually stimulating, with an overall satisfaction rate of 88% for the quality of the course.

Teaching Methods and Assessment

In Years 1 and 2, formal lectures and practical laboratory-based classes are supplemented by small-group tutorials and group project work to provide a stimulating range of learning activities.

In the final year, teaching is delivered through seminar-based sessions with the opportunity for extensive discussion with specialists in the field. You will also undertake an extended research project which will be carried out under the
guidance of a member of staff and on a topic linked to our research activities. Please note that the integrated Master’s programme follows a modified Year 3 structure, with Bioinformatics training and a group-based research project. Throughout the course you will be expected to write essays and contribute to small group tutorials, enabling you to learn the essential skills of structuring and presenting ideas and arguments. There is a strong element of continuous assessment in all years, and your progress is regularly reviewed to ensure that you realise your full potential.

Your progress is measured through a combination of end-of-module examinations and continuous assessment of coursework, which may include written reports of practical/research project work, library projects, and workshop assignments, amongst other activities.

Transferable Skills
The School is committed to assisting you in developing a full range of transferable skills, including numeracy, literacy, problem solving, abstract writing, effective team working, analytical and critical thinking, and integrating information.

These skills are crucial to enhancing your future employability, and you will have many opportunities to practise and hone these skills throughout the duration of your degree.

Learning Facilities
The University Science Library has a large collection of textbooks and reference books, together with teaching videos and other multimedia learning tools. The School’s Learning and Teaching Resource Centre offers spacious study rooms that are equipped with up-to-date networked computers. Students can also benefit from a new £1.5 million e-Learning and Assessment Facility, which further enhances the learning opportunities available within the School.

Technology in Teaching
The School prides itself on the extensive use of cutting-edge technology to support your learning. Students are given thorough training and have access to the latest machines.

Our teaching and learning is becoming increasingly computer assisted, with significant use of a virtual learning environment, allowing access to module-related material such as supporting notes, self-assessment tests, molecular models, and animations.

Some of your modules will require use of the Internet and specific computer programmes to help you to collect and analyse data, as well as trace the scientific articles that you will need.

Personal Tutors
At the start of your course you will be assigned a personal tutor from our academic staff. Your personal tutor will see you on a regular basis and will be available to offer guidance and advice in academic and personal matters. We aim to help you overcome any problems, however big or small, as soon as possible. Welsh-speaking students may opt to have a tutor who is also a Welsh speaker.

Course highlights:

- **Flexibility:** Your degree title remains flexible up until Year 3. Depending on module selection, you can choose to stick with your original degree registration, or to choose another of our bioscience courses that is more suited to your academic interests.
- **Research leaders:** You will learn in an active research environment with courses delivered by research leaders who are experts in their field.
- **Global opportunities:** Our degrees are available as sandwich courses with a year spent on a professional research placement, which can be in the UK or further afield. Some modules also include field courses in tropical locations such as Tobago and Malaysia.
Field Courses

Direct experience of plants and animals in their natural habitats is an important part of modern biology. At Cardiff we run an impressive range of field courses to give you essential hands-on experience of modern techniques and practical skills in field biology, such as bird-ringing, microbial analysis, small mammal trapping, pit fall trapping and surveying for bats.

In the second year, students on the Ecology and Conservation module can choose from several specialised, project-based courses that run in a variety of locations throughout the world.

Our field courses typically include Tropical Ecology (Borneo, Malaysia), Marine Ecology (Caribbean and Malaysia), Island Ecology (Wales), River Ecology (Wales) and Woodland Ecology (Wales).

All of our field courses include an independent research project, often involving the behaviour or ecology of animals (ranging from mammals, birds or fish, to insects and other invertebrates, both marine and terrestrial).

For example, you might investigate whether having their fish stolen by gulls is a serious loss for breeding puffins or merely a nuisance, or investigate the territorial behaviour of fish on a coral reef.

Please note that the availability of individual field courses can be affected by travel constraints or staff availability.

Professional Training

An attractive feature of our degrees is that they can all be taken as sandwich courses in which the third year is spent in professional training.

The Professional Training Year (PTY) provides an opportunity for you to spend 9-12 months in an academic, clinical or industrial research laboratory, or other approved establishment, in order to gain first-hand research experience.

You will undertake all aspects of research, including experimental design, data acquisition and analysis and, finally, data presentation with the production of a project report and presentation.

A placement report, written by you, will count towards your final degree assessment.

Our PTY Coordinators will support you in finding a suitable position that is relevant to your research interests and career aspirations, and a tutor will keep in touch with you and visit you during your placement.

Many placements are in the UK, but in recent years we have had an increasing number of placements in other locations, including Southeast Asia, South Africa, Germany, Italy, Australia, Madagascar and the USA.

Finding a placement is a competitive process and success cannot be guaranteed. However, we have always been successful in placing the vast majority of our Professional Training Year students.
Examples of Student Placements

**GlaxoSmithKline, Hertfordshire**
GlaxoSmithKline is one of the world’s leading research-based pharmaceutical and healthcare companies. It has scientists working in a large range of fields, and regularly takes students for paid placements. Students work alongside a group of scientists on product research and development in a particular area, such as pharmaceutical testing, nutritional product development, infection and immunity, or respiratory medicine.

**Roskamp Institute, Florida, USA**
The Roskamp Institute is world-renowned, where cutting-edge research is committed to understanding causes of and finding cures for neuropsychiatric and neurodegenerative disorders. On this placement, the student was involved in research studies of Alzheimer’s disease, traumatic brain injury and drug addiction. The work provided our student with first-hand experience of laboratory techniques in neuroscience research, as well as interaction with and care for patients with neurodegenerative disorders.

**Welsh Heart Research Institute, Cardiff**
The Welsh Heart Research Institute is a dedicated cardiovascular research institute based at the University Hospital of Wales, Cardiff. The research teams work at both the molecular and clinical level, with a current research focus looking at the links between obesity, inflammation and vascular disease. Students work alongside a research team to help with their specific research focus. Placements in Cardiff enable students to stay in a city they already know, and helps to keep costs down.

**Francis Crick Institute, London**
The Francis Crick Institute is a biomedical discovery institute dedicated to understanding the fundamental biology underlying health and disease. Students are attached to a specific research group which they assist in studying questions such as how muscles generate force, the production of vaccines against malaria, how the heart forms, or how genes control sex.

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**Henry Finnigan**
“I spent my Professional Training Year (PTY) in a lab at Otago University in New Zealand. The year was a great experience as I got to apply theoretical knowledge in a practical environment, learn new techniques and meet some great people, as well as having the opportunity to explore a new country. I would highly recommend a PTY to anyone.”
The Environment Agency, various locations
The Environment Agency is a national organisation with many bases around the UK. It works to protect the environment, as well as protecting businesses, industries and our homes from the environment. Work placements are very varied, with one involving taking fish samples from the River Thames, identifying and counting the catch, evaluating the data in relation to short and long-term trends, and also in relation to pollution patterns in the river. The data generated from this placement contributed to evaluation of the management plan for the river.

Vernalis Ltd, Cambridge
One of the UK’s leading development-stage pharmaceutical companies, Vernalis takes promising product candidates along a commercially-focused path to market. Vernalis currently has several programmes in development centred on CNS, oncology and inflammation. Vernalis has taken several Cardiff Bioscience students to work on research-based projects centred around the key activities of the company. The students are supervised on both intellectual and technical aspects and cover a range of areas including molecular biology, biochemistry and cell biology. Vernalis is situated close to the attractive city of Cambridge and a short train ride from London.

Morvus Technology Ltd, Carmarthenshire
Morvus is a pharmaceutical company that exploits its expertise in the areas of drug and target-discovery and the commercialisation of novel technology. Its primary focus is oncology. Cardiff students have worked with dedicated supervisors on projects of direct relevance to the company’s objectives, and have gained experience in a variety of molecular and cellular techniques. Morvus is situated in an idyllic location within the grounds of the National Botanic Garden of Wales.

Game and Wildlife Conservation Trust (GWCT), various locations
The Game and Wildlife Conservation Trust (GWCT) is a UK charity which is primarily involved in the study of game species such as partridge, grouse, and hare, as well as wildlife conservation and farming. It has a number of centres throughout the UK where scientific research is carried out on the ecology and population dynamics of different species. Most years, GWCT has taken one or two placement students from Cardiff who have worked on projects such as the use of cover by red-legged partridges on mixed arable farms, and the role of sparrowhawks as predators of grey partridges. Students get free accommodation, travelling expenses, and about £80 per week.

Danau Girang Field Centre (DGFC), Borneo, Malaysia
The DGFC is a collaborative research and training facility managed by Cardiff University and Sabah Wildlife Department. It is situated in the Lower Kinabatangan Wildlife Sanctuary in Sabah, Malaysia. Each year, we usually have at least two students on placement at the centre where they are involved in a variety of research projects such as the ecology and genetics of the orang-utan, Bornean elephant, proboscis monkey and long-tailed macaque. The placements are supervised by Dr Benoit Goossens who is the director of the centre. The centre hosts field courses run by Cardiff and other universities, as well as a number of visiting academics and researchers. As well as undertaking their own research projects, placement students are also involved in the day-to-day running of the centre.
Final Year Projects

In your final year you will carry out a project designed to help you develop the skills of a research scientist, including collecting and analysing data, and presenting your findings to the scientific community. The project is worth 30 credits, and is assessed through a written report (dissertation) and presentation, the marks for which will contribute to the final grade for your degree. Prizes are awarded for the best projects.

A wide variety of topics will be available for your project. Your supervisor will guide you in the selection of a project that will yield useful results in the time available, and will be on hand to give you guidance and assistance throughout the work. You will need to complete a safety assessment for your project, and seek ethical approval where necessary.

There are different kinds of projects available, each differing in the method of data collection.

**Practical Projects**

Students generate their own data in a laboratory, field, or teaching environment, or a combination of the three. This may require an element of experimental design, or may contribute to the work of a current research group. You will work alongside postgraduate research students and other research staff, and will experience the excitement of working in an active research group. Your project will make use of the sophisticated research equipment within the School.

This is excellent preparation for any student wishing to pursue a research career, or go on to further study.

**Literature Projects**

Students collect their ‘data’ from primary scientific published literature which then needs to be analysed and critically appraised based on the specific title that has been set or agreed with their supervisor. This is a good option for students who do not enjoy a laboratory setting, or may want to pursue a more literature-based career, such as being a scientific editor or journalist.

**Scientific Engagement Projects**

Students collect their ‘data’ from primary scientific literature, which they will then use to develop a piece of scientific engagement material. The engagement material produced must be tested on the correct audience and analysed. This is a good choice for students wishing to go into public engagement or teaching.

**Data analysis**

Students are given a large data set which they analyse and draw conclusions from. This type of project may suit mathematically-minded individuals, or those wishing to follow a career in statistical analysis and data interpretation.

Please note: Students on the integrated Master’s programme will have a different Year 3 experience to those studying for a BSc. This group of students will undertake Bioinformatics training and a group-based research project.
First Year Course – All Degrees

All of our degrees start with a common first year course that provides a holistic approach to the early stages of a bioscientist’s training.

Introduction
As the fundamental knowledge required for biological sciences, biomedical sciences, biochemistry and neuroscience is similar, students can benefit a great deal by taking a broad Year 1 curriculum with a common starting point, with the option of diverting into more specialised areas of learning in Years 2 and 3.

The common first year system has the big advantage of giving you flexibility of degree choice. Depending on module selection in Years 2 and 3, you can choose to stick with your original degree registration, or select another that is more suited to your aspirations and academic interests.

Common First Year Modules
Our Common First Year is a modern, modular course with stimulating practical classes carried out in spacious, fully-equipped laboratories. Assessment and feedback occurs throughout each module allowing you to keep a personal check on how you are progressing.

A full list of modules is shown in the table below (please note that the exact modules may be subject to change, but this will give you a general idea of what we have on offer in your first year). Each module is worth 20 credits and you will need to study all modules in the Common First Year to a total value of 120 credits. Note that each module is worth 20 credits.

Full List of Modules

<table>
<thead>
<tr>
<th>Module</th>
<th>Credits</th>
<th>About the module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Chemistry</td>
<td>20</td>
<td>This module will give you a broad knowledge and understanding of physical, inorganic and organic chemistry to take you up to and past A-level chemistry and to provide you with the chemical background needed for your courses at Levels 1, 2 and 3. It also describes the key structural, informational and catalytic macromolecules found in living organisms, including proteins, nucleic acids (DNA and RNA), lipids and carbohydrates, and explains their functional significance.</td>
</tr>
<tr>
<td>Structure and Function of Living Organisms</td>
<td>20</td>
<td>This module will provide an overview of the structure and function of living organisms at a systems level. You will explore the disciplines of anatomy, physiology and neuroscience through themes including: movement, respiration, nutrition, transport, reproduction and communication. A comparative approach will be taken to highlight similarities and differences in systems across species.</td>
</tr>
<tr>
<td>The Dynamic Cell</td>
<td>20</td>
<td>This module will provide a comparative overview of the structures and activities of prokaryotic and eukaryotic cells. You will learn about the relationship between structure and function, and how the characteristics of cells facilitate their metabolic activities and allow them to contribute to the activity of tissues. The module will cover comparative cellular structure; cellular energetics; cellular reproduction; cells in the context of tissues; cellular homeostasis and cell-to-cell interactions. The module will take a comparative approach, addressing these areas in prokaryotes, animals, plants and fungi.</td>
</tr>
<tr>
<td>Organisms and Environment</td>
<td>20</td>
<td>This module will explore the great natural diversity that exists in the living world and examine the adaptations required to survive in a range of environments. By studying organisms and how they interact you will discover the relevance of these interactions on humans, the impact of humans on sustainability and the application of knowledge arising from these studies.</td>
</tr>
<tr>
<td>Genetics and Evolution</td>
<td>20</td>
<td>This module will provide a foundation in genetics, evolution, and developmental biology, introducing the associated terminology and concepts needed for further study. You will explore variation between individuals and within populations, evolution and speciation, techniques for analysing genetic variability, gene structure and expression, and genome organisation.</td>
</tr>
<tr>
<td>Skills for Sciences</td>
<td>20</td>
<td>This module aims to enhance skills and competencies in the three broad areas of transferable, academic and scientific skills, and includes a number of laboratory practicals. It will also introduce you to the historical and theoretical background of contemporary science.</td>
</tr>
</tbody>
</table>

A total of 120 credits have to be taken in the first year hence all modules are compulsory.
Integrated Masters’

Introduction
Our four-year integrated Masters’ courses in Biological Sciences, Biochemistry, Biomedical Sciences and Neuroscience enable you to explore the current frontiers of knowledge in your chosen field, and they form an excellent basis for a future career in scientific research.

The final year consists of an extended project in an active research laboratory (worth 80 credits), together with a 20-credit module in Advanced Research Methods and a 20-credit Frontiers in Biosciences module. Your project will be novel, and the results may even be complete enough to be published in a scientific journal. You will be trained and supported in carrying out your project by researchers, helping you develop your skills as a practical research scientist.

Entry
You may apply for one of our integrated Masters’ programmes via UCAS (a higher entry tariff is required compared to BSc courses) or, alternatively, you can opt to switch to a Master’s programme at the start of Year 3, subject to space constraints and academic achievement.

For those entering an integrated Master’s programme, progression on the Master’s track beyond Year 2 depends on satisfactory academic performance (generally an average of 60% or above in Year 1 and Year 2), with the option to switch to a BSc degree at this point.

Integrated Masters’ may also be taken with a sandwich year, dependent on student loan availability and approval from your funding body.
Introduction

Our Biological Sciences degree provides the greatest possible choice and flexibility, allowing you to choose modules across virtually the whole range of subjects that the School offers, with the exception of practical human anatomy (although you will still cover human anatomy in Year 1).

You have the freedom to decide how your academic experience develops. You can choose to specialise in a particular area or to keep an interest in the broad basis of biological subjects and explore the interdisciplinary research that underpins much of the School’s success.

A wide choice of subjects is available to study including, but not limited to: animal and plant biology, microbiology, genetics, systems biology, ecology, disease, behaviour, neuroscience, cell biology, development and evolution. You will also have the option of undertaking a field course, which can be based within the UK or overseas (see page 12).

The School also maintains a permanently staffed Field Station in Borneo, as well as leading the University’s Sustainable Places and Water Research Institute, allowing access to a wide range of exciting training opportunities.

In your second and final years, you will have the opportunity to select specific modules that allow you, should you wish, to graduate with a degree title that indicates a particular specialism, such as BSc Biological Sciences (Genetics) or BSc Biological Sciences (Zoology).

Recent graduates in this area have gone on to careers in research institutes, environmental consultancies, drug companies, the NHS, teaching, and many non-biological careers such as banking and management.

A significant number progress to undertake Masters or PhD training programmes.

Year One

We believe that a holistic approach to a subject is important in the early stages of a bioscientist’s training. At Cardiff, you can benefit a great deal by taking a broad Year 1 curriculum with a common starting point, with the option of diverting into more specialised areas of learning later in the course.

The first year gives you a strong foundation in all the biological disciplines, and essential related areas, ensuring that all students are equally well prepared for subsequent studies in their second and final years. Lectures are supported by extensive practical and problem solving classes.

Modules will generally begin by overlapping with A-level studies, but will quickly progress to greater depth and scope.

Modules

- Skills for Science
- Structure and Function of Living Organisms
- Organisms and the Environment
- The Dynamic Cell
- Biological Chemistry
- Genetics and Evolution

Year Two

Your second year allows for more specialisation, and will build on the knowledge and practical skills gained in the first year.
You will undertake a combination of lectures, tutorials and practical classes that will continue to develop a broad knowledge of the biological sciences from which you can specialise further in the final year.

You can choose any of the eleven 40-credit modules (listed below) within Year 2, up to a total of 120 Credits, leaving you free to pursue particular areas of interest. You may also have the option of undertaking one of our project-based field courses, which run in a variety of locations both in the UK and abroad (see page 12).

Available modules
- Animal Diversity and Adaptation
- Genetics and Its Applications
- Biochemistry
- Brain and Behaviour
- Cell Biology
- Concepts of Disease
- Ecology and Conservation
- Fundamental Neuroscience
- Molecular Biology of the Gene
- Physiology
- Developmental and Stem Cell Biology

All module titles are correct at time of publication and are indicative of subject areas. However, module titles are subject to final confirmation. Some module combinations may be restricted by timetabling and space constraints.

Final Year
Our final year curriculum enables you to specialise in more detail within one of the major research themes of the School. This approach immerses you in the research culture of the biosciences, by means of research-driven teaching and a final year project that allows you to investigate a topic in much greater detail.

In your final year you will complete three 30-credit modules (from a choice of 17), plus the 30-credit research project.

Required modules
- Final year project

Optional modules
- Advanced Cell Biology and Imaging
- Advanced Musculoskeletal Biology and Tissue Engineering
- Advances in Developmental and Stem Cell Biology
- Advances in Physiology and Pathophysiology
- Biodiversity & Conservation Biology
- Cancer: Molecular mechanisms, diagnostics and therapeutics
- Contemporary Topics in Disease
- Diseases and Disorders of the Nervous System
- Ecosystems, Sustainability and Global Change
- Evolution and Species Adaptation
- Genes to Genomes
- Infection Biology & Epidemiology
- Plants for the Future
- Systems Biology and Modelling
- Synthetic Biology and Protein Engineering
- Systems Neuroscience
- The ‘omics revolution (Bioinformatics & Functional Genomics)

All module titles are correct at time of publication and are indicative of subject areas. However, module titles are subject to final confirmation. Some module combinations may be restricted by timetabling and space constraints.

Examples of Recent Final Year Research Projects
- The effect of isolated invertebrate grazing and elevated temperature on two interacting Basidiomycetes fungi: Resinicum bicolor and Phanerochaete velutina
- Exposure to in utero mainstream cigarette smoke can cause genetic changes resulting in later life cancer
- Sea turtles, climate change and the extinction threat
- Culture Independent analysis of lactic acid bacteria (Lactobacillus spp.) in the gut of volunteers on a probiotic feeding trial
- Learning, memory and trail tracking behaviour of the terrestrial snail Helix aspersa

Please note: Students on the integrated Master’s programme will follow a modified Year 3 structure, undertaking Bioinformatics training and a group-based research project.

Clare Baranowski
Marine Biologist

“After graduating in English Literature, I successfully applied for a place on Cardiff’s Zoology course in order to pursue my dreams of becoming an environmentalist. The skills I developed through my Zoology degree and extracurricular activities whilst at Cardiff University have been integral to building my career to date.”

Tropical Biodiversity Assessment Field Course in Borneo

Fluorescent intensity map of bone staining in the developing skeleton of the Zebrafish (Danio rerio). Image generated by Dr Anthony J. Hayes, Bioimaging Research Hub, Cardiff School of Biosciences.
Introduction

Biochemistry is the study of biological systems at the molecular level. It is a subject that has a rich history of scientific discoveries, from enzymology and metabolic pathways to the discovery of genes and the structure of DNA. Today the subject embraces new areas, such as genomics, systems and synthetic biology.

During your degree studies you will learn the key role that biochemistry contributes to advances in all biological disciplines, including medicine and biotechnology.

You will receive hands-on training in laboratory and field research techniques, and gain practical experience of widely transferable skills in computing, statistics, data analysis and presentation.

The School also houses a permanently staffed Field Station in Borneo, as well as leading the European Cancer Stem Cell Research Institute, one of the University’s flagship institutes, allowing access to a wide range of exciting training opportunities.

Our Biochemistry qualifications provide excellent foundations for careers within all areas of biological and molecular sciences, and offer strong training for research scientists.

Year One

You will follow the common first year course (see page 16), which provides a grounding in essential subjects, including a Biological Chemistry module that presents topics at the chemistry/biology interface and explores modern analytical techniques.

The biochemical components of the first year course include topics such as structure and function of proteins (including enzymes), DNA structure and replication, gene organisation and expression, genetic manipulation techniques, lipid and carbohydrate biochemistry, and key aspects of metabolism.

Modules

- Skills for Science
- Structure and Function of Living Organisms
- Organisms and the Environment
- The Dynamic Cell
- Biological Chemistry
- Genetics and Evolution
Year Two

Your second year will put greater emphasis on the experimental basis of biochemistry. You will undertake practicals that cover modern research techniques such as recombinant DNA manipulation and analysis, protein and lipid biochemistry and microbiology, with a strong focus on data analysis and interpretation.

You will build also build on your Year 1 knowledge to give you a sound grounding in more advanced areas of gene function, molecular genetics, protein biochemistry, metabolism, cell biology, development, evolution and cell signalling.

Alongside required modules in ‘Biochemistry’ and ‘Molecular Biology of the Gene’, you will select an additional 40-credit module from a choice of nine.

**Required modules**
- Biochemistry
- Molecular Biology of the Gene

**Optional modules**
- Animal Diversity and Adaptation
- Applications of Genetics
- Brain and Behaviour
- Cell Biology
- Concepts of Disease
- Ecology and Conservation
- Fundamental Neuroscience
- Physiology
- Stem Cells, Differentiation and Development

All module titles are correct at time of publication and are indicative of subject areas. However, module titles are subject to final confirmation.

Some module combinations may be restricted by timetabling and space constraints.

Final Year

In your final year, there is a strong emphasis on independent learning, and you can investigate areas of current importance in biochemistry, such as synthetic biology and protein structure, genetic engineering, stem cell biology and tissue engineering. Your research skills will be developed further during your final year project (see page 15).

Tutorials and research seminars on wider aspects of the subject, including medical and industrial applications, will extend the scope of your learning. In your final year you will complete three 30-credit modules plus a 30-credit research project.

**Please note:** Students on the integrated Master’s programme will follow a modified Year 3 structure, undertaking Bioinformatics training and a group-based research project.

**Required modules**
- Final year project
- Genes to Genomes
- Synthetic Biology and Protein Engineering

**Optional modules**
- Advanced Cell Biology and Imaging
- Advanced Musculoskeletal Biology and Tissue Engineering
- Advances in Developmental and Stem Cell Biology
- Advances in Systems Physiology and Pathophysiology
- Biodiversity & Conservation Biology
- Cancer: Molecular mechanisms, diagnostics and therapeutics
- Contemporary Topics in Disease
- Diseases and Disorders of the Nervous System
- Ecosystems, Sustainability and Global Change
- Evolution and Species Adaptation
- Infection Biology & Epidemiology
- Plants for the Future
- Systems Biology and Modelling
- Systems Neuroscience
- The ‘omics revolution (Bioinformatics & Functional Genomics)

All module titles are correct at time of publication and are indicative of subject areas. However, module titles are subject to final confirmation.

Some module combinations may be restricted by timetabling and space constraints.

**Examples of Recent Final Year Research Projects**
- The effect of oral hygiene products on the human gut microflora
- The search for Halibut Angiogenin: Isolating the Angiogenin gene from the genome of the Atlantic Halibut (Hippoglossus hippoglossus)
- Defining the Role of Fun30 in Chromatin Remodelling in Yeast
- Expression of recombinant lumican and keratocan in Chinese hamster ovary cells
- Investigating placental glycogen storage in response to alterations to PHLDA2 gene dosage

Surface rendered confocal microscope images of pollen grains (mixed species). Image generated by Dr Anthony J. Hayes, Bioimaging Research Hub, Cardiff School of Biosciences
Introduction

Biomedical science is the science that underpins medicine and medical research. Our Biomedical Sciences degree takes a broad approach which covers many biological subjects such as human physiology, human structure, pharmacology, biochemistry, genetics and microbiology. The curriculum is informed by the extensive range of biomedical research undertaken within the School of Biosciences and at the University Hospital of Wales, enabling you to receive training in contemporary topics including cancer biology, stem cells, tissue engineering, gene therapy, neurodegenerative diseases and many more.

The School also houses the Welsh Centre for Anatomical Education as well as leading the European Cancer Stem Cell Research Institute, one of the University’s flagship institutes, allowing access to a wide range of exciting training opportunities.

This degree programme would suit students who are interested in the biomedical sciences, and includes the option to graduate with a more specialised degree title, such as BSc Biomedical Sciences (Anatomy) or BSc Biomedical Sciences (Physiology), if desired.

Whatever choices you make during the Biomedical Science degree at Cardiff, the knowledge and skills that you develop will make you employable in a broad range of careers within biomedical science such as research, sales, publishing and teaching. Alternatively you may wish to further your studies with a higher degree.

Course title | UCAS code
---|---
BSc Biomedical Sciences | BC97
BSc Biomedical Sciences with Professional Training Year | BC9R
MBiomed Biomedical Sciences | 51T8
MBiomed Biomedical Sciences with Professional Training Year | 52G9
BSc Biomedical Sciences (Anatomy) | See page 27
BSc Biological Sciences (Physiology) | See page 27

For our Preliminary Year options, please see page 26
Year One
We believe that a holistic approach to a subject is important in the early stages of a biomedical scientist’s training. At Cardiff, you can benefit a great deal by taking a broad Year 1 curriculum, with the option of focussing on more specialised areas of learning later in the course.

Lectures are supported by extensive practical and problem solving classes. Modules will generally begin by overlapping with A-level studies but will soon progress to greater depth and scope.

Modules
- Skills for Science
- Structure and Function of Living Organisms
- Organisms and the Environment
- The Dynamic Cell
- Biological Chemistry
- Genetics and Evolution

Year Two
Your second year allows for more specialisation, and will build on the knowledge and practical skills gained in Year 1.

Alongside a required module in ‘Concepts of Disease’ or ‘Physiology’, you will select two additional 40-credit modules from a choice of ten, leaving you free to pursue particular areas of interest.

Throughout the year you will continue to develop a broad knowledge of the biomedical sciences from which you can specialise further in the final year.

Required modules
- Concepts of Disease
- Physiology

Optional modules
- Animal Diversity and Adaptation
- Genetics and Its Applications
- Biochemistry
- Brain and Behaviour
- Cell Biology
- Fundamental Neuroscience
- Molecular Biology of the Gene
- Practical Anatomy
- Developmental and Stem Cell Biology

Final Year
Our final year curriculum enables you to specialise in more detail within one of the major research themes of the School. This research-driven approach immerses you in the research culture of the biosciences, by means of research-driven teaching and a final year project that allows you to investigate a topic in much greater depth.

In your final year you will complete three 30-credit modules, plus the 30-credit research project.

Required modules
- Final Year research Project
- Contemporary Topics in Disease
- Advances in Physiology
- Pathophysiology

Optional modules
- Advanced Anatomy
- Advanced Cell Biology and Imaging
- Advanced Musculoskeletal Biology and Tissue Engineering
- Advances in Developmental and Stem Cell Biology
- Advances in Systems Physiology and Pathophysiology
- Biodiversity & Conservation Biology
- Cancer: Molecular mechanisms, diagnostics and therapeutics
- Diseases and Disorders of the Nervous System
- Evolution and Species Adaptation

Please note: Due to space restrictions in our Anatomy Centre, numbers may be limited and in the event of the option being oversubscribed preference will be given to those students who intend specialising for the Biomedical Sciences (Anatomy) degree.

Please note: Students on the integrated Master’s programme will follow a modified Year 3 structure, undertaking Bioinformatics training and a group-based research project.

All module titles are correct at time of publication and are indicative of subject areas. However, module titles are subject to final confirmation.

Some module combinations may be restricted by timetabling and space constraints.

Examples of Recent Final Year Research Projects
- Protein Kinase C (PKC) Isoenzymes in the Treatment of Cancer
- Caffeine supplementation: Effects on exercise performance
- Air pollution and respiratory diseases: Exacerbation or developmental effect?
- A review of the biological mechanisms of juvenile idiopathic arthritis: A presentation and development of a pamphlet to increase awareness of the public in to the cause and impact of JIA on the daily life of sufferers
- Discuss the effects of the ergobrass harness on the postural muscle activity of brass players
- Could microRNA-based therapy have a potential in the future treatment of Osteoarthritis?
- Probiotics: do they work, what is the evidence?

Beth Mansfield
“Due to the techniques I’ve learned and the facilities I’ve had access to, my time at Cardiff has really prepared me for my chosen career path after university. If I was to apply to university again I would definitely choose Cardiff – I’ve had the chance to make new friends, be involved in high-end research and live in an amazing city.”
Neuroscience

Introduction

Neuroscience is the study of nervous systems, their component nerve cells and the functioning of the brain. The human brain contains one hundred thousand million such cells, and how it works remains one of the most alluring and baffling of all questions on the frontiers of understanding. Can the brain understand the brain? Can the brain understand the mind? Is the brain a giant computer or something more?

This degree will demonstrate ways in which we can attempt to answer these questions, using approaches that range from the biochemistry and biophysics of the nerve cell to a psychologist’s investigation of the machinery of the mind.

The recent growth of this subject is due to the important contribution neuroscience is making to the understanding and treatment of mental and other neurological disorders.

The School also leads the Neuroscience & Mental Health Research Institute, one of the University’s flagship institutes, allowing access to a wide range of exciting training opportunities.

Year One

We believe that a holistic approach to a subject is important in the early stages of a scientist’s training. At Cardiff, you can benefit a great deal by taking a broad Year 1 curriculum, with progression into more specialised areas of learning later in the course.

Lectures are supported by extensive practical and problem solving classes. Modules will generally begin by overlapping with A-level studies, but will soon progress to greater depth and scope.

Modules

- Skills for Science
- Structure and Function of Living Organisms
- Organisms and the Environment
- The Dynamic Cell
- Biological Chemistry
- Genetics and Evolution

Required modules

- Brain and Behaviour
- Fundamental Neuroscience

Optional modules

- Animal Diversity and Adaptation
- Applications of Genetics
- Biochemistry
- Cell Biology
- Concepts of Disease
- Molecular Biology of the Gene
- Physiology
- Stem Cells, Differentiation and Development

All module titles are correct at time of publication and are indicative of subject areas. However, module titles are subject to final confirmation.

Some module combinations may be restricted by timetabling and space constraints.

Year Two

Your second year allows for more specialisation, and will build on the knowledge and practical skills gained in Year 1.

In Year 2, you will study topics in membrane biophysics, pharmacology, anatomy of the human brain, psychological analysis, practical neuro-physiology, cellular signalling and neuroendocrinology.

Alongside required modules in ‘Brain and Behaviour’ and ‘Fundamental Neuroscience’, you will select an additional 40-credit module from a choice of eight.

Student examining a hippocampal slice under a microscope

www.cardiff.ac.uk/biosciences
Final Year

Your final year modules will cover current research on the biology of nervous system disorders, sensory processing and perception, neuronal development and plasticity.

You will complete three 30-credit modules plus a 30-credit research project.

Your final year project may be conducted in a University laboratory, or in an outside neuroscience laboratory. Library-based projects are also offered (see page 15).

Please note: Students on the integrated Master’s programme will follow a modified Year 3 structure, undertaking Bioinformatics training and a group-based research project.

Required modules

- Final year research project
- Diseases and Disorders of the Nervous System
- Systems Neuroscience

Optional modules

- Advanced Cell Biology and Imaging
- Advanced Musculoskeletal Biology and Tissue Engineering
- Advances in Developmental and Stem Cell Biology
- Advances in Systems Physiology and Pathophysiology
- Biodiversity & Conservation Biology
- Cancer: Molecular mechanisms, diagnostics and therapeutics
- Contemporary Topics in Disease
- Ecosystems, Sustainability and Global Change
- Evolution and Species Adaptation
- Genes to Genomes
- Infection Biology & Epidemiology
- Plants for the Future
- Synthetic Biology and Protein Engineering
- Systems Biology and Modelling
- The ‘omics revolution (Bioinformatics & Functional Genomics)

All module titles are correct at time of publication and are indicative of subject areas. However, module titles are subject to final confirmation.

Some module combinations may be restricted by timetabling and space constraints.

Examples of Recent Final Year Research Projects

- Is current literature in support of the BDNF hypothesis of depression?
- Examining the relationship between the progression of Parkinson’s Disease and the degeneration of the olfactory system: A review of literature from 1965-2011
- Phantom Limb Sensations: Why are they perceived as pain?
- Critical evaluation of the neural mechanisms behind the improvement in Parkinson’s disease gait following auditory cueing
- The role of miRNAs in disease states affecting learning and memory

Use of electromyography to measure conduction velocity in the ulnar nerve
**Preliminary Year**

<table>
<thead>
<tr>
<th>Course title</th>
<th>UCAS code</th>
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<tbody>
<tr>
<td>BSc Biological Sciences with Preliminary Year</td>
<td>C102</td>
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<tr>
<td>BSc Biological Sciences with Preliminary Year and Professional Training Year</td>
<td>C103</td>
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<td>BSc Biochemistry with Preliminary Year</td>
<td>C74C</td>
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<td>BSc Biomedical Sciences with Preliminary Year and Professional Training Year</td>
<td>B901</td>
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<tr>
<td>BSc Neuroscience with Preliminary Year</td>
<td>B141</td>
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<tr>
<td>BSc Neuroscience with Preliminary Year and Professional Training Year</td>
<td>B140</td>
</tr>
</tbody>
</table>

**Our Preliminary Year forms the first year of a four-year degree programme leading to a BSc in any of the subjects offered by the School of Biosciences. The purpose of the Preliminary Year is to provide students who don’t already have a suitable background in science with the knowledge and understanding that will enable them to thrive in the Year 1 curriculum and beyond.**

Students will cover key topics in Biology, Chemistry and Mathematics (comprising 100 credits), along with 20 credits worth of optional module that may be taken from other Schools, the Centre for Professional Education and/or the School of Modern Languages.

Upon successful completion of the Preliminary Year, you can choose to follow any of our four main degree programmes – BSc Biological Sciences, BSc Biomedical Sciences, BSc Biochemistry and BSc Neuroscience. At the start of the final year, you will also have the option of applying to transfer to one of our integrated Master’s courses depending on satisfactory academic progress and space availability.

The Preliminary Year is aimed at AS/A-level (or equivalent) students who have good grades but in subjects not suitable for entry into Year 1; overseas students who do not hold science qualifications equivalent to the UK A-level; and mature students re-entering the education system.

This course is not usually available for students who have taken the appropriate AS/A-levels but not achieved the grades required for first year entry.

**Required modules**

- Cells and the Chemistry of Life
- Genetics, Evolution and Diversity
- Nutrition, Transport and Signalling
- The Way the Body Works
- Fundamental Aspects of Chemistry
- Thermodynamics, Kinetics and Equilibria
- Chemistry of Organic Compounds
- Inorganic and Redox Chemistry
- Preliminary Mathematics I
- Preliminary Mathematics II

[www.cardiff.ac.uk/biosciences](http://www.cardiff.ac.uk/biosciences)
Additional Degree Options

Alongside our four main degrees, you also have the option of graduating with a degree that indicates a particular specialism.

Selection of these ‘exit degrees’ will take place at the start of your final year and require that you make certain module choices in both Years 2 and 3. These alternative degree titles are not available with our integrated Masters’ courses.

You will receive academic guidance, throughout the course to help you choose the degree pathway that best fits your interests and career aspirations.

BSc Biological Sciences (Genetics)
Genetics is the investigation of all aspects of inheritance. In recent years, the development of molecular techniques has dramatically increased our knowledge of genome structure and organisation (e.g. the human genome project), and this has revolutionised our understanding of all biological systems and their evolution. Genetics has become relevant to every sphere of biological study, including animal, plant, microbial, medical, biotechnological, and ecological investigations.

Your second and final years will include advanced courses on molecular genetics and genomics and will give you the opportunity to practice genetic engineering techniques.

A choice of optional modules will enable you to combine your course with other specific areas of biology such as microbiology, cell biology, evolution, conservation biology and behavioural ecology.

BSc Biological Sciences (Zoology)
Zoology gives us insight into the roles of all kinds of animals in their ecosystems.

This is regarded as vital knowledge if we are to maintain healthy natural environments, control pests and diseases, conserve biodiversity and preserve endangered species, as well as develop a sustainable human population.

Our Zoology ‘exit degree’ is the appropriate route for those with a committed interest in the broad field of animal biology. It includes the evolution and diversity of the main animal groups, including ecology, physiology and genetics. Optional field courses form an important part of the degree.

There is particular expertise within the School in behaviour and brain function, and both of these topics form part of this degree. You will receive hands-on training in modern laboratory and field research techniques, and gain practical experience of widely transferable skills in computing, statistics, data analysis and presentation.

To study Biological Sciences (Genetics) or Biological Sciences (Zoology), please apply for our BSc Biological Sciences degree (see page 18)

BSc Biomedical Sciences (Anatomy)
Anatomy is unique among the biomedical sciences; it encompasses the study of all levels of human structural organisation, from the sub-cellular to the population.

Classically, anatomical study has proceeded by observation and dissection, supported by histology and embryology. Recent advances in cell and tissue biology, and in developmental biology, have resulted in much greater understanding of the formation and functioning of the body at gross, cellular and molecular levels, and have had great impact on anatomical study.

At Cardiff, the traditional approach of human dissection is combined with cutting-edge digital developments to provide you with a stimulating and up-to-date degree programme. Human topographical anatomy is taught alongside developmental/cell biology, pathophysiology, neurobiology, stem cell biology and tissue engineering. Numbers are limited on this course due to constraints in the Anatomy Centre where dissection is taught.

BSc Biomedical Sciences (Physiology)
Physiology is concerned with how the body works. It is a multidisciplinary science, using a wide variety of techniques, and has always been closely allied to medicine. Although there is constant interaction between the advancing frontiers of clinical research and physiological science, much physiological work is undertaken by scientists rather than clinicians.

In this ‘exit degree’ option, the modules you take in Year 2 will provide you with a thorough grounding in physiology and its relevance to medicine. Emphasis will be placed on the experimental basis of the subject, and you will become familiar with new technologies and their impact.

In your final year, you will take modules that reflect our great expertise in the areas of cell-physiology, neurophysiology and pathophysiology.

To study Biomedical Sciences (Anatomy) or Biomedical Sciences (Physiology), please apply for our BSc Biomedical Sciences degree (see page 22)
Employability and Careers

All of our bioscience degrees provide you with a strong foundation on which to pursue a career based on the knowledge and skills acquired during your studies. Throughout your degree, you will also develop transferable skills in numeracy, information technology, and effective communication that will provide access to a wide range of graduate careers, including teaching, management, marketing and finance.

Experience has shown that students who have followed one of our sandwich degrees, with a year in relevant professional training, are particularly well placed for obtaining degree-related employment at the end of their studies. Relevant work experience and a good employer’s reference are very valuable commodities in the job market. Our graduates are routinely placed in a wide variety of posts both in Britain and abroad, and, in 2016, 91.5% of graduates reported that they were in employment and/or further study within six months of graduation.

Research
The School has a very active involvement in research with over 150 postgraduate students, most of whom are pursuing research degrees leading to the qualification of PhD (Doctorate). We have four major research groups focused on Molecular Biosciences, Neuroscience, Organisms and Environment, and Biomedicine, all of which are internationally recognised.

The School leads the University’s European Cancer Stem Cell Research Institute, the Sustainable Places Research Institute, the Water Research Institute, and the Neuroscience and Mental Health Research Institute, allowing access to a wide range of exciting training and research opportunities.

Many of the research areas relate to obtaining a better appreciation of medical problems, improving quality of life, or the environment. These activities are supported by the latest technologies including: microscopy; genetic manipulation; transgenic organisms; cell and tissue engineering; stem cell facilities; microarrays and automated DNA sequencing.

Our associated field centres throughout the world support a variety of ecological studies ranging from the conservation of Orangutans in Southeast Asia to sequencing the Giant Panda genome in China.

Our research activity affects your degree in a number of very positive ways. During your practical classes our staff and postgraduate students will assist in your supervision, and you will learn from them what it is like to be actively involved in research. Staff are fully informed of the latest developments in their field, which means that their lectures are always up-to-date, and that our libraries are well stocked with research journals.
Higher Degrees
A proportion of our graduates stay on at Cardiff to study for a higher degree before taking their first job, most undertaking three years’ research for their PhD (doctorate). Some move to other reputable institutions, including Oxford and Cambridge Universities, to take their PhD.

Examples of current research in the Biomedical Sciences and related areas
- Cancer stem cells
- Cancers of the mammary, bowel, pancreas, prostate, brain and blood
- Functional significance of synuclein proteins in the normal and degenerating nervous system
- Development of autologous cell-based methods for repair of the degenerate nervous and immune systems
- Stem/progenitor cells in mammalian organogenesis
- Elucidating the function of lysosomes in health and disease
- Epigenetics of normal development and disease
- Pathophysiology of calcium signalling specifically related to pancreatitis
- Inflammation, atherosclerosis and regulation of gene expression
- Signalling mechanisms regulating bone and cartilage turnover, in osteoporosis, rheumatoid arthritis and osteoarthritis

Examples of current research in Biochemistry and related areas
- Molecular and biochemical techniques for the control of mosquitoes
- The cellular basis of plant growth and cell division
- New technologies for molecular diagnostics of diseases
- Engineering protein structure and function
- RNA regulation through spatial localization
- Chromatin structure and function
- Drosophila muscle development and differentiation
- Transcriptional regulation in Drosophila sperm production
- Membrane protein structural biology
- Transcriptional networks in plant stem cells and synthetic genetic circuits

Examples of current research in the Biological Sciences and related areas
- Control of agricultural pests
- Global change and rivers
- Otters as environmental indicators
- Foraging behaviour of fungal mycelial systems
- Reproductive and feeding strategies in insects
- Aquatic biodiversity in the Himalayas
- Analysis of gut microbiota using molecular probes
- Use of molecular probes to monitor environmental pollution
- Conservation genetics of livestock breeds
- Biology of host-parasite interactions

Nobel Laureate
Cardiff University is the proud home to a Nobel Prize Winner:

Professor Sir Martin Evans FRS
Professor Sir Martin Evans FRS of the School of Biosciences was a recipient of the Nobel Prize for Medicine in 2007, for research which created the technology known as gene targeting, now used in virtually all areas of biomedicine – from basic research to the development of new therapies.

Careers and Employability Service
The University offers a careers and employability service for students, graduates and postgraduates. You can access careers information, explore your options and speak to a consultant who can advise you of opportunities relating to your degree or preferred field, including advice on postgraduate degrees. The service offers guidance on preparing a CV and job applications and gives you the chance to meet and network with top graduate recruiters at Careers Fairs and events. If you are looking for work experience, the careers service can assist with planning and organising your placement.
Applications
To be considered for any of the degree courses you should apply online via the UCAS website using the ‘UCAS Apply’ facility. To use this facility you need to log onto: www.ucas.ac.uk/apply

The website will provide you with information on how to apply and explain the procedure.

Applications should be made by 15th January. UCAS will send your application to the University. After we have received and considered it, we may invite you to visit the School sometime during the period November to April.

There will not normally be a formal interview, but there will be a guided tour of the School, Students’ Union and campus. You will meet students and staff, providing us with the opportunity of getting to know more about you and enabling you to find out what life is like as a bioscience student at Cardiff.

Typical number of places on common first year course: 400
Typical number of applications: 2000

UCAS Personal Statement
The personal statement is an important part of the selection process and should contain information relating your commitment to your chosen degree programme. As well as academic achievement, it is expected that applicants to these programmes should have looked into the various aspects of the subject and the careers it might lead to.

Equal Opportunities
Cardiff University is committed to promoting equality and diversity in all of its practices and activities, including those relating to student recruitment, selection and admission. The University aims to establish an inclusive culture which welcomes and ensures equality of opportunity for applicants of all ages, ethnicities, disabilities, family structures, genders, nationalities, sexual orientations, races, religious or other beliefs, and socio-economic backgrounds. This commitment forms part of the Equality and Diversity Policy which is available at: www.cardiff.ac.uk/cocom/equalityanddiversity/index

Applicants with Disabilities/ Specific Needs
All offers to study at Cardiff University are made solely on the basis of academic merit. Where applicants have specific requirements that relate to a disability or medical condition, they are encouraged to discuss these with relevant staff in order that appropriate arrangements can be made to ensure the University provides an accessible environment. Specifically, applicants are invited to contact the Disability Adviser who can provide information about the applications procedure, course delivery and access to the physical environment. Where appropriate, informal visits can be arranged in which applicants can view accommodation and meet academic staff.

The Disability Adviser can be contacted at:
The Student Advisory Service
50 Park Place, Cardiff CF10 3AT
Tel/Minicom: +44 (0)29 2087 4844
Email: disability@cardiff.ac.uk

There are a range of opportunities to visit the University
The School Website
www.cardiff.ac.uk/biosciences
Our website provides you with further information about the School of Biosciences.

The Use of Animal-derived Products in Undergraduate Teaching
Given the nature of the subjects, the use of functioning non-human tissue and animal-derived products in laboratory work is essential to the programmes of study offered by Cardiff School of Biosciences. In the very rare case of a student being unable to carry out work on living non-human organisms, alternatives may be sought where practicable, where allowed in course regulations, and where there is no conflict with learning outcomes. We try to satisfy the needs of our students. If in doubt, applicants can obtain further information from Admissions Tutors.

Typical Entry Requirements
For detailed entry requirements and latest typical offers please see: www.cardiff.ac.uk/ugcourses

A-level:
BSc: For students taking Biology OR Chemistry A-level a typical offer would be AAB, where an A grade must be achieved in the Biology or Chemistry A-level. Students taking Biology and a second science A-level are typically made an offer of AAB-ABB. Two AS-levels may take the place of a non-science A-level, and a Core Maths qualification is counted as an AS-level-equivalent. Critical Thinking and General Studies A-levels are not accepted. Where a separate practical endorsement is reported a pass will be required in this element.
Integrated Masters: AAA to include either Biology or Chemistry.

WBA:
Typical Welsh Baccalaureate offer:
The Welsh Baccalaureate Advanced Skills Challenge Certificate will be accepted in lieu of one A-Level (at the grades listed above), excluding any specified subjects.

IB:
Typical International Baccalaureate offer:
34 points with 666 at Higher Level to include Biology and Chemistry; or 35 points and 7 in either Biology or Chemistry at Higher Level.

BTEC Extended Diploma in Applied Science
BSc and Integrated Masters:

Access to HE Qualifications
The Access to Higher Education Diploma (Biosciences) awarded by Agored Cymru is suitable for entry into our courses with the following attainment.
BSc: 30 level 3 credits to be awarded at Distinction, 15 to be awarded at Merit.
Integrated Masters: 45 level 3 credits to be awarded at Distinction.

Other
Applications from those offering alternative qualifications are welcome, as are those who may have combinations of qualifications or other relevant work/life experience.

Preliminary Year
This course forms the first year of a four-year degree programme (five years in the case of a sandwich programme) leading to a BSc in any of the subjects offered by the School of Biosciences. It is used mainly by AS/A-level students who have good grades but in the wrong subjects.
The Preliminary Year covers key topics in Biology, Chemistry and Mathematics and will underpin future studies.
The course is not available for students who have taken appropriate AS/A-levels but not achieved the grades required for first year entry.

Overseas Applicants
We welcome applications from overseas students and the School already has a number of overseas students studying both undergraduate and postgraduate courses. An offer will be made to you based on achieving an entry standard equivalent to UK qualifications.
For further information, please visit: www.cardiff.ac.uk/international

Notes for Welsh Language Applicants
We recognise that if you are a Welsh speaker you may feel more comfortable speaking to a Welsh speaking personal tutor. Provided there are Welsh speaking members of staff in your subject area, every effort will be made to allocate a Welsh speaker to you. If you wish, you can also submit your assessed work and take your examinations through the medium of Welsh, regardless of the language of tuition of the course you are following.

Open Days
Four University-wide Open Days are held each year. These provide the opportunity to visit all schools in addition to residences, the Students’ Union and sports facilities.
For further information please visit our website at: www.cardiff.ac.uk/opendays
The Admissions Tutor
School of Biosciences,
Sir Martin Evans Building,
Museum Avenue,
Cardiff CF10 3AX
Tel: 029 2087 4296
Email: bioscience-ug@cardiff.ac.uk
Web: www.cardiff.ac.uk/biosciences

Tuition Fees and Financial Assistance
The University charges an annual fee which covers all tuition fees, registration and examinations other than the re-taking of examinations by applicants not currently registered. Please note charges for accommodation in University Residences are additional.
Please see the following website for more information: www.cardiff.ac.uk/fees

Scholarships and Bursaries
For more information please visit the following website:
www.cardiff.ac.uk/scholarships

Useful websites for information about tuition fees and financial assistance:
Student Support Centre website:
www.cardiff.ac.uk/financialsupport/index.html
Welsh Assembly Student Finance web pages:
www.studentfinancewales.co.uk
Student Finance England:
www.studentfinanceengland.co.uk
Student Loans Company:
www.slc.co.uk
Terms and Conditions

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Tel: 029 2087 4455
Email: RobertsL9@cardiff.ac.uk

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How to find the School

The School of Biosciences is located on Park Place in the Sir Martin Evans Building (highlighted in orange on the map above).
To find out more about the School of Biosciences please visit our website: www.cardiff.ac.uk/biosciences

Got questions about student life? Get them answered at: www.cardiff.ac.uk/insiders

Some of our current students are sharing their experiences online through their Facebook pages, so if you want to know what life as a student at Cardiff is really like, then you can find out now. There is also lots of information about what is happening in Cardiff, including articles written by our students, videos, and much more.