Biology

Degree options in the Faculty of Science

MBiol (Integrated Masters degree)
Biology

MBiochem (Integrated Masters degree)
Biochemistry

MMarBiol (Integrated Masters degree)
Marine Biology

BSc (Single Honours degrees)
Behavioural Biology
Biochemistry
Biology
Biomolecular Science (offered by the School of Chemistry, includes some Biology modules) B+
Cell Biology
Ecology & Conservation
Evolutionary Biology
Marine Biology
Molecular Biology
Neuroscience (offered by the School of Psychology & Neuroscience, includes some Biology modules) Zoology

BSc (Joint Honours degrees)
Biology and one of:
Economics
Geography
Geology
Mathematics M+

BSc “with” degrees
Honours in which the majority of the course deals with the first named subject:
Biology with Arabic
Biology with French W, F+

Biology with Philosophy

Biology with Psychology

Biology with Statistics M+

Biology with Mathematics M+

International Baccalaureate Points: 38 including HL6 in Biology and HL6 in Chemistry

Second year entry BSc (except Biochemistry and Joint degrees with Mathematics or Statistics), MBio and MMarBiol
SQA Advanced Highers and GCE A-Levels should include Biology (or Human Biology) and one other science from Chemistry, Mathematics M+ or Physics
SQA Advanced Highers: AB M+
GCE A-Levels: AAA M+

For second year entry for Joint degrees with Mathematics or Statistics – one Advanced Higher must include A in Mathematics – A-Levels must include Further Mathematics and an A* in Mathematics.

First year entry BSc Biochemistry and MBiochem
SQA Highers and GCE A-Levels should include Biology (or Human Biology) and Chemistry
SQA Highers: AAAB
GCE A-Levels: AAB
International Baccalaureate Points: 36 including HL6 in Biology and HL6 in Chemistry

Second year entry BSc Biochemistry and MMarBiol
SQA Advanced Highers and GCE A-Levels should include Biology and Chemistry
SQA Advanced Highers: AB
GCE A-Levels: AAA
International Baccalaureate Points: 38 including HL6 in Biology and HL6 in Chemistry

Preference will be given to candidates offering strong science qualifications over and above the stated minimum requirements.

For full Faculty entrance requirements, see page 53.

For degrees combining more than one subject, the subject with the higher likely grades determines the grades you need. You will also need to meet any further subject-specific requirements as outlined on their pages.

For further country-specific qualifications and pre-degree foundation programmes see: www.st-andrews.ac.uk/study/international

Do I need previous knowledge of this subject?
– Yes, see above.

Subject enquiries
Dr Stuart MacNeill and Dr Christian Rutz
E: bioadmissions@st-andrews.ac.uk
“Studying at St Andrews has given me much more than just education. It has instantly given me the feeling of home and it never ceases to amaze me how much the University cares about the well-being of the students. Thanks to the flexibility of the schedules, I was able to engage in other sciences beside Biology in the first year, and explore different aspects of the subject in the second year.”

Katarina (Bratislava, Slovakia)

**Why study Biology here?**

- We conduct world-class research that welcomes student participation and offers a unique learning experience.
- We provide a focused and friendly learning environment with close contact between staff and students.
- Our first year programme encourages you to choose modules from other fields including other sciences, the humanities and the arts to provide a well-rounded and interdisciplinary education.
- Our newly revised second year programme allows you to choose up to seven biology modules spanning a wide range of topics from cell biology to evolutionary biology, invertebrate zoology to biochemistry.
- All our second year students also take a semester-long module – Research Methods in Biology.
- A programme of small group tutorials (4 – 6 students) in second and third years brings students together with individual academics.
- Flexibility within the School allows you to change your degree direction during your first two years, before specialising in third and fourth years.
- All our Biology students carry out an independent final year research project which enables you to conduct and write up your own research and potentially publish this in a scientific journal.
- We have a dedicated marine laboratory in St Andrews. The Scottish Oceans Institute (currently undergoing a multi-million pound refurbishment) incorporates the largest Sea Mammal Research Unit in the world and many other Marine Biology research groups.
- We have strong interdisciplinary links with the Schools of Chemistry, Earth & Environmental Sciences, Geography & Sustainable Development, Mathematics & Statistics, Medicine, Physics & Astronomy and Psychology & Neuroscience.
- Students have the opportunity to gather research experience around the globe.
- In the UK Research Excellence Framework 2014, Biology was second in the UK based on the impact of its research.
- For the latest news, stories and additional information for prospective students see: http://biology.st-andrews.ac.uk

**What will I study?**

Biology involves the study of life at all levels of organisation from the molecular biology of virus replication to the study of animals and plants in their natural habitats. Biology touches on many aspects of contemporary life, from drug design and investigating the molecular basis of Alzheimer’s disease, to the migration and conservation of marine mammals – all of which can be studied at St Andrews. We teach these subjects, and many more, to give either an overall or a specialist view of Biology, depending on your degree course.

**First and second year modules in Biology**

Studying Biology at St Andrews means that a final choice of degree does not have to be made until the end of second year. In the first year, students take two modules in Biology, together with four modules selected from the full range of subjects delivered by other Schools in the University. In the second year, most students take between four and eight of the eleven modules available within Biology.

In first year the modules introduce you to core material relevant to all degree programmes in areas such as animal and plant biology, molecular biology, cell biology and biochemistry. In the second year you choose modules which will best prepare you for your intended degree (or group of possible degrees).

New topics are introduced in some second year modules such as evolutionary biology and ecology, whilst other modules allow you to continue to develop your knowledge of cellular, biochemical, molecular or organisal biology.

**Single Honours degrees (BSc) – third and fourth years**

The Honours programmes occupy the final two years of study and consist of a series of modules covering more specialised topics. The first year of Honours provides modules developing the specific knowledge-base for the degree programme. In the final year of Honours, half of the time is spent attending combinations of the numerous tutorial-style modules leading to different specialist Honours degrees. The focus of these advanced modules is student-led, enquiry-based learning. The other half of the fourth year is occupied by a substantial research project. For more details of our teaching programme, visit our School of Biology webpages.

**Integrated Masters degrees (MBiol, MBiochem, MMarBiol) – third, fourth and fifth years**

The third year of the five year Integrated Masters courses comprise six Biology modules focused on advanced core material in your chosen area. In the fourth year students typically apply to undertake a year-long research placement often away from St Andrews, in a research institute or in industry, as well as an experimental design distance learning module. The fifth and final year of the Masters degrees involves highly-specialised taught courses and, in the case of MBiochem, a substantial research project.
Typical methods of assessment

All of our 1000- and 2000-level modules are assessed by an equal weighting of coursework and written examinations. At 3000-level, most modules give a higher weighting to examinations, and at 4000-level some modules are entirely assessed by coursework, while others still include written examinations in addition to coursework but these examinations tend to be shorter and the weighting is usually 50% or less.

School of Biology degrees

When reading our list of degree programmes, bear in mind that you will be able to move easily between most Biology degree intentions during your first two years of study. Once you reach your Honours years, your programme will include specialised modules in the subject area you have chosen.

Behavioural Biology

Behavioural Biology covers behavioural ecology, the mechanisms of animal behaviour, the processes of evolution and speciation, adaptive physiology of animals and animal cognition. An emphasis is given to current topics like cultural learning, animal communication and molecular ecology.

Additional choices include marine biology, marine mammals, neuropsychology, biodiversity and conservation, and animal-plant interactions.

Biochemistry (BSc or MBiochem)

Biochemical mechanisms are involved in all life processes, so biochemical techniques are applied to a broad spectrum of fields from viral replication to neurobiology. The biochemical aspects of cell and organisational function and regulation are covered in modules on protein function, molecular genetics, membranes and cell communication, bioenergetics and pharmacology as well as a final-year laboratory project with one of the relevant research groups in the School.

Biology (BSc or MBiol)

This allows you to select your own route through our Honours modules. If you have broad interests and are reluctant to specialise and wish to take a wide variety of topics throughout all four years, this is the degree for you. Many of our applicants initially apply for a degree in Biology and then after they have sampled a range of first and second year Biology modules decide on a more specialist degree.

Biomolecular Science (see School of Chemistry page 66)

Cell Biology

Cell Biology is related to molecular biology in that cell function depends on molecular structures and biochemical processes. However, cell biology is also the basis for understanding the physiology and development of animals and plants, as well as many aspects of pathology. The Honours programme includes modules that emphasise structure and function in the cells of animals, plants and microbes. It explains how and when cells divide and how they interact as they form tissues and embryos.

Ecology & Conservation

Topics such as global warming, environmental change and species extinction are increasingly in the public eye. This Honours programme deals with core aspects of modern conservation biology and ecology. Modules cover the ecology of terrestrial and aquatic environments, the process of evolution and speciation, adaptive physiology of plants and animals, population biology, molecular ecology, biodiversity, sustainability and conservation issues, and behavioural ecology.
“Biology was my additional subject module as a mature humanities student, but the broad range of sub-honours tuition captivated me. Molecular Biology offers an intensive grounding in laboratory techniques and recent findings in an exhilarating discipline with myriad research possibilities. Training received through summer internships allowed me to design recombinant DNA to investigate genomic mediators of evolution. I cannot imagine another institution offering a higher level of flexibility and support.”

Alan (Edinburgh, Scotland)

Evolutionary Biology
Theodosius Dobzhansky once said “Nothing in biology makes sense except in the light of evolution”. This Honours programme deals with the theory of evolution, evolutionary genetics, environmental physiology, terrestrial and aquatic ecology, evolution of behaviour, biodiversity and conservation, human evolution, and evolutionary ecology.

Marine Biology (BSc or MMarBiol)
We are situated on the shores of the North Sea and have the world-renowned Scottish Ocean Institute, a research institute which incorporates the world-class Sea Mammal Research Unit. Other active research areas include marine molecular ecology, genomics, the ecology and development of marine invertebrates, fish muscle physiology, the behaviour of marine animals and the ecology of coasts and estuaries. In this programme you will explore aquatic environments, evolutionary processes, behavioural biology, biodiversity and biological sustainability, marine microbiology, and marine mammal biology.

Molecular Biology
Building on the foundations of molecular and cellular biology laid down in first and second years, this Honours programme covers core topics in molecular biology such as chromosome dynamics, gene structure and expression, molecular genetics, molecular virology, structural biology and bioinformatics.

Neuroscience (see School of Psychology & Neuroscience page 142)

Zoology
The study of Zoology involves a wide-ranging exploration of the animal kingdom investigating the structure, development, evolution, classification, behaviour, and distribution of all types of animal, both living and extinct. The choice of modules provides organismal, cellular, and molecular perspectives, including developmental, behavioural, neurophysiological, and environmental approaches with examples ranging from single-celled animals to marine mammals.

Joint Honours degrees
The following degrees allow you a balanced and logical combination of modules with an emphasis on the areas of Biology which combine well with the other subject.

- Biology and Economics
- Biology and Philosophy
- Biology and Geography
- Biology and Psychology
- Biology and Geology
- Biology and Mathematics or Statistics

Other Honours degrees
Biology with Arabic, Biology with French
Biology is the major component of these programmes in which the development of written and spoken language skills is emphasised.

Psychology with Biology
More Psychology than Biology modules are taken in order to fulfill the requirements for accreditation in Psychology.

Additional compulsory charges
Students need to cover costs for lab and course materials of up to £25 per year. There are also additional charges of up to £100 in third year for either a field trip, a reading party excursion or a biochemistry lab class. Substantial additional expedition costs apply to some fourth year modules, including demand-driven modules such as Polar Ecology and Scientific Diving (pictured on pages 64 and 62). Students on the Integrated Masters degrees may also encounter increased accommodation costs in their fourth year if they choose to take industry or research placements outside of St Andrews.

Study abroad
You may apply to the University’s St Andrews Abroad programme. See page 22.

At Honours you may have the opportunity to apply to carry out some of your studies abroad. In 2017-2018, Honours students in the School of Biology may participate in Study Abroad at European universities and James Cook University in Australia through the Biology Abroad programme. This provides experience of scientific work in the context of a different culture, as well as broadening the range of project topics that we are able to offer.

For options available during your intended period of study, as well as information about eligibility, the application and selection process, and costs involved, please see: www.st-andrews.ac.uk/studyabroad

Careers

Biology graduates are in high demand. They are keenly sought by many organisations including government, universities, research institutes and major companies. There are also exciting opportunities in a new generation of innovative grassroots companies, some of them spin-outs of our own School. Advisers to the developers of marine and terrestrial renewable energy sources, for example, need biologists for assessing the impact of novel installations. Our graduates also enter many other diverse fields such as management, accountancy, marketing, journalism and teaching as employers recognise the quality of our training.

Our Biology graduates have gone on to find success in a wide variety of careers in research, industry and business including (amongst many others):

- Professional biologists in biological research, conservation, higher education and the pharmaceutical, biomedical and other industries
- Researchers and advisers in government
- Journalists
- Advisers, researchers and managers in the National Health Service
- Teachers
- Forensic scientists
- Management consultants
- Marketing and advertising experts

See also page 46 for details of the University’s Careers Centre.