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)
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
Philosophy
Psychology
Statistics

BSc “With” Degrees
Honours in which the majority of the course deals with the first named subject:
Biology with Arabic
Biology with French

Entrance Requirements

Obtaining the following grades will not guarantee you a place as we consider all aspects of every application, including the Personal Statement.

BSc Degree, MBiol Degree, MMarBiol Degree
SQA Highers and GCE A-Levels should include Biology and one other science from Chemistry, Mathematics and Physics
SQA Highers: AAAB
GCE A-Levels: AAB
International Baccalaureate Points: 36 including HL6 in Biology and HL6 in another approved science*

First Year Entry MBiochem Degree
SQA Highers and GCE A-Levels should include 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 MBiochem Degree
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

* An approved science for IB: Biology, Chemistry, Computing Science or equivalent, Physics, Design Technology, Mathematics or Further Mathematics.

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 Entrance Requirements determines the grades you need. You will also need to meet any further subject-specific Entrance 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

A postgraduate demonstrator (in blue coat) explains the use of the microscope to a first year student.
“Studying biology gives you flexibility in your first two years; while I was drawn to molecular biology from the start I really enjoyed learning the foundation of zoology, ecology and evolution. Now in my third year, having chosen my degree subject, teaching takes place in small classes by leading scientists in their field. Teaching involves lectures and tutorials as well as labs where practical skills are developed.”

Charlotte (Wuppertal, Germany)

Features

* 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.
* Flexibility within the School allows you to change your degree direction during your first two years.
* Our final year Honours programme is based on small, specialised modules including practical options in the laboratory or the field.
* Your Honours dissertation work enables you to conduct and publish your own research.
* 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.
* We have a dedicated marine laboratory in St Andrews. The Scottish Oceans Institute 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, Geography & Geosciences, Mathematics & Statistics, Medicine, Physics & Astronomy and Psychology & Neuroscience.
* For 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 four of the five modules available within Biology.

Table: Structure of Biology Degrees

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<thead>
<tr>
<th>First Year</th>
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<tbody>
<tr>
<td>Biology 1</td>
<td>Module from another subject</td>
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<tr>
<td>Biology 2</td>
<td>Module from another subject</td>
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<th>Second Year</th>
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<tr>
<td>At least two, and typically four, of the following: Biochemistry and Molecular Biology, Cell Structure and Function, Comparative Physiology, Ecology and Evolution, Zoology</td>
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Honours

Broad-based, degree specific Core Modules (Year 3) Specialised Modules and a Research Project (Year 4) (MBiol, MBiochem and MMarBiol students take a year-long research placement in Year 4 and conduct advanced studies in Year 5)

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, cellular biology and genetics. 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 organisinal 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 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 a substantial research project.
Study abroad
At Honours you may have the opportunity to apply to carry out some of your studies abroad. The School of Biology conducts exchanges with European universities under the Erasmus+ scheme. This provides experience of scientific work in the context of a different European language and culture, as well as broadening the range of project topics that we are able to offer. In 2016 - 2017 we have exchange partner institutions in North America, Asia and Australia in our Biology Abroad Programme and the St Andrews Abroad programme (see page 46). For options available during your intended period of study, see: www.st-andrews.ac.uk/studyabroad/outgoingstudents

For further information about eligibility, the application and selection process, and costs involved, please see: www.st-andrews.ac.uk/studyabroad

Typical class sizes and teaching information
First Year: lectures 200 - 250, practicals 90 - 130
Second Year: lectures 100 - 150, practicals 50 - 80
Honours Third Year: 20 - 60
Honours Fourth Year: 5 - 15

All first and second year modules involve daily lectures (usually with one lecture slot every week being used for tutorials or seminars instead) and also weekly practical classes. A separate series of supporting classes develops transferable skills such as written and oral presentation skills and data handling.

Teaching is delivered by lectures, seminars, and tutorials with a strong practical element at all levels. In addition, emphasis is placed on transferable skills including IT and the presentation of material both orally and in writing. In addition to providing in-depth experience with laboratory or field investigation, our substantial final-year project allows you to develop research skills that are strongly desired by many prospective employers and also by graduate schools offering postgraduate degrees. These can also lead to your first publication in a scientific journal.

Third year modules are taught by lectures, seminars and practicals, but final (fourth) year is very different, involving a major project that occupies between a third and half of the year. The rest of the year consists of small focused modules taught in small groups on the selected topics of special interest to staff members and students.

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 they tend to be shorter and the weighting is usually 50% or less.

Integrated Masters Degrees
Biology (MBiol), Biochemistry (MBiochem), Marine Biology (MMarBiol)
The new five year Integrated Masters degrees in Biology, Biochemistry and Marine Biology are designed to enhance your research experience, preparing you for a career within the scientific sector. In the first three years core modules in each subject cover fundamental aspects. In the fourth year you will undertake a year-long industrial or research placement before your final year, taking advanced research-led modules in your chosen speciality and an extended laboratory research project.

Single Honours Degrees
When reading our list of degree programmes, bear in mind that you will be able to move easily between most Biology Honours 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, neuroscience, biodiversity and conservation, and animal-plant interactions.

Biochemistry (BSc)
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 organisinal 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
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 cells interact as they form tissues and embryos.
“Over my time in the idyllic University of St Andrews I have had the wonderful opportunity to study a diverse range of topics within my own area of personal interest, marine biology, as well as branching out to the entire breadth of biology itself. As well as this, the opportunities to study outwith my subject, from laser physics to music theory have provided me with a fundamental academic base that will support me throughout the rest of my academic career as well as the rest of my life.”

Rufus (Kilmacolm, Inverclyde, Scotland)

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.

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
We are situated on the shores of the North Sea and have the world-renowned Scottish Oceans 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
Progressing from a sub-honours foundation in molecular and cellular biology, this Honours programme covers core topics such as protein function, molecular genetics, membranes and cell communication, molecular virology, structural biology, bioinformatics and gene expression.

Neuroscience
(see School of Psychology & Neuroscience page 142)

Zoology
Zoology degrees are wide-ranging explorations 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 Geography
- Biology and Geology
- Biology and Mathematics
- Biology and Psychology
- Biology and Philosophy
- Biology and 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 fulfil 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). Students on the Integrated Masters degrees may also encounter increased accommodation costs to carry in their fourth year if they choose to take industry or research placements outside of St Andrews.

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 pharmaceutica, 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

For further examples of the careers followed by our graduates see: http://bit.ly/sta-biology-careers

See also page 36 for details of the University’s Careers Centre.