Life Sciences
**Introducing Life Sciences**

Life Sciences at Liverpool brings together biological and medical sciences. We investigate development and normal function in humans, animals, plants, microbes and single cells, as well as disease processes and treatments. Life scientists work at the heart of critical topics for the planet, such as global warming, new energy sources, food security and pandemics.

We aim to make you an expert in one particular field while having the ability to cross discipline boundaries, a combination of strengths that is highly attractive to prospective employers.

You will be able to tackle the issues that dominate today’s society and are of international relevance, such as global warming, new energy sources, and the treatment of plant, animal and human diseases.

New technological developments in genome sequencing and bioinformatics are providing fresh insights across life sciences, and the demand for graduates in these areas of science is therefore extremely high.
**Why choose Life Sciences at Liverpool?**

Choose Life Sciences at Liverpool and you will have over 100 years of teaching and research experience supporting you. Over that time, we have developed an academic community that draws on disciplines from across the life sciences, offering you a breadth and depth of flexible study choice we believe is unrivalled in the UK. Here, you can really shape your studies according to your interests, and be confident that the teaching you receive is informed by the very latest, ground-breaking research from across our renowned Faculty of Health and Life Sciences.
**Shape your study with real flexibility and choice**
You’ll study in one of the largest Schools of Life Science in the UK drawing on over 100 years of teaching and research experience, meaning you can shape your studies by choosing modules from across the entire spectrum of the life sciences; a breadth of choice unique in the UK. You’ll also enjoy links to our Schools of Medicine, Dentistry and Veterinary Science, and the Liverpool School of Tropical Medicine.

**Enjoy excellent career prospects**
You’ll benefit from our excellent international reputation for research in growth areas such as the biotechnology, post-genomic and pharmaceutical industries. 92% of our recent graduates were employed or in further study six months after graduation.

**Strengthen your employability through overseas study**
Give your future employability a further boost by choosing to study or take part in field courses abroad. Our networks stretch as far afield as Uganda, Thailand and China.

**Work in leading-edge facilities**
Life science is at the leading-edge of science, so our facilities are too. Over £30 million has recently been invested in the School’s facilities, such as our Biology Teaching Centre, the state-of-the-art Biosciences Building, the Biomedical Sciences Building and the Human Anatomy Resource Centre. This ensures your studies are fully supported by the very best in teaching and research equipment.

**Study abroad**
There are many opportunities for Life Sciences students to study or work abroad. These include exchange schemes with partner universities across the world, where students may study for one semester or one year. For further information on student exchange, visit [www.liverpool.ac.uk/goabroad](http://www.liverpool.ac.uk/goabroad)

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**Good to know:**

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>367</strong></td>
<td>Year One undergraduates in 2016</td>
</tr>
<tr>
<td><strong>93%</strong></td>
<td>Average satisfaction for our programmes (NSS 2016)</td>
</tr>
<tr>
<td><strong>92%</strong></td>
<td>Are employed or in further study within six months of graduating (Destination of Leavers from Higher Education Report 2014/15)</td>
</tr>
<tr>
<td><strong>95%</strong></td>
<td>Or higher overall satisfaction for Anatomy and Human Biology, Bioveterinary Science, Human Physiology, Pharmacology (NSS 2016)</td>
</tr>
</tbody>
</table>

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**Offers study abroad opportunities**

**Offers a Year in China**

**A number of our programmes are accredited**
**Year in China**
The Year in China is the University of Liverpool’s exciting flagship programme offering undergraduate students from a huge range of departments, including Life Sciences, the opportunity to spend one year at our sister university Xi’an Jiaotong-Liverpool University (XJTLU), following XJTLU’s BA China Studies degree classes. See [www.liverpool.ac.uk/yearinchina](http://www.liverpool.ac.uk/yearinchina) for more information.

**You are given lots of opportunities to shape the direction you want to take by selecting specific modules. When I was researching where to study this aspect drew me to Liverpool as I liked the idea of this freedom and that I could select the modules I liked most.**

Lydia Hawker
Pharmacology BSc (Hons)

**How you learn**
You will experience a range of learning environments during your studies at Liverpool. These will include student-centred activities as well as lectures, tutorials, laboratory practicals, dissection classes, fieldwork, data handling sessions and computer workshops. Some of these activities will be performed individually, such as personal research projects, and others in small tutorial or project groups, in addition to formal lectures and workshops. You will have research staff as well as your own academic adviser for individual tuition on our acclaimed tutorial programme.

**How you are assessed**
As well as factual knowledge and understanding, biologists need practical and organisational skills, and an ability to work both alone and with other people. We record development of these abilities through continuous assessment during the semester and by final examination. You will also prepare posters, complete tests, analyse data, give short talks, research the scientific literature and write essays and reports. The style of examination progresses from short answers towards the essay format in the later years of each degree programme, as your understanding deepens.
Invest in your future

As a Life Sciences graduate from the University of Liverpool, you will have an excellent set of career options ahead of you. For those committed to a career as a research scientist, further study for a higher degree (MBiolSci, MSc, MRes, MPhil or PhD) at the University of Liverpool or elsewhere is the normal route.

In the public sector, Life Sciences graduates are in demand in research institutes, government departments, the National Health Service, forensic science and the Environment Agency. Commercial sectors that actively recruit graduates from the life sciences include the pharmaceutical, food, biotechnology, water and agriculture industries.

There is also an increasing demand for life scientists to contribute to the public understanding of science as journalists and information/liaison officers, in view of the ethical and environmental issues that arise, for example, by developments in molecular biology and biotechnology.

A postgraduate qualification (PGCE) for entry into the teaching profession is also an option, with significant financial inducements provided to meet the current demand for science teachers. In addition to all of the opportunities for graduates in general, including careers outside of biology (such as management, accountancy and human resources), where the skills you have obtained in our degree programmes will be of considerable benefit, our degree programmes are also popular routes to postgraduate Medicine, Dentistry or Veterinary Science.

Recent employers of our graduates
- AstraZeneca
- BBC
- Blue Planet Aquarium
- Chester Zoo
- Crown Prosecution Service
- Eli-Lilly
- Environment Agency
- GlaxoSmithKline
- Home Affairs, Security and International Development
- Ministry of Defence
- NHS
- Public Health England
- Red X Pharma
- Royal Society of Biology
- RSPCA
- Unilever
- United Utilities
- Vodafone.

Work experience opportunities
Students on our four-year MBiolSci programme have the opportunity to take elective internships abroad at our partner institutions.

For example, while at universities in Thailand, students have worked on topics such as coral reef and mangrove ecology, genetics of shrimp development and new drugs for tuberculosis. Students in their final year of the MBiolSci also have the opportunity to work in industry, either for six-week internships or for the entire final year. You may have the exciting option to undertake a foreign field course in western Uganda which is available when studying a number of our undergraduate degree programmes.
The 12-day trip involves study at both the Kibale National Park (10 days) and Queen Elizabeth National Park (2 days).

Topics covered whilst in Uganda include tropical forest and savannah ecology, biodiversity patterns, primate behaviour and ecology, subsistence versus commercial agricultural practices, and ecotourism.

A passion for learning: postgraduate studies
Many of our students decide to stay at Liverpool as postgraduate students. For further information on postgraduate study, the prospectus is now online in two formats for either research degrees (MPhil/PhD) at www.liverpool.ac.uk/study/postgraduate/research/ or for taught courses at www.liverpool.ac.uk/study/postgraduate/taught/

My programme has given me experience of research. The thing I enjoy most is definitely the dissection aspect, because not a lot of universities offer this, which is one of the reasons I picked the University of Liverpool. It just helps to learn things that are actually real, instead of from a book or a model.

Yasmina Sahraoui
Anatomy and Human Biology BSc (Hons)

It’s hard to know exactly what you want to do when selecting a programme, so being able to choose the modules that interest you and transfer from a three year BSc to a four-year integrated master’s allows you to tailor your degree around your passion.

Sam Cooper
Biological Sciences BSc (Hons)
# Degrees

<table>
<thead>
<tr>
<th>Program</th>
<th>UCAS Code</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy and Human Biology BSc (Hons)</td>
<td>B110</td>
<td>3 years</td>
</tr>
<tr>
<td>Biochemistry BSc (Hons)</td>
<td>C700</td>
<td>3 years</td>
</tr>
<tr>
<td>Biological and Medical Sciences BSc (Hons)</td>
<td>C130</td>
<td>3 years</td>
</tr>
<tr>
<td>Biological Sciences BSc (Hons) (also leading to a choice of Honours School)</td>
<td>C100</td>
<td>3 years</td>
</tr>
<tr>
<td>Bioveterinary Science BSc (Hons)</td>
<td>D900</td>
<td>3 years</td>
</tr>
<tr>
<td>Genetics BSc (Hons)</td>
<td>C400</td>
<td>3 years</td>
</tr>
<tr>
<td>Human Physiology BSc (Hons)</td>
<td>B120</td>
<td>3 years</td>
</tr>
<tr>
<td>Microbiology BSc (Hons)</td>
<td>C500</td>
<td>3 years</td>
</tr>
<tr>
<td>Pharmacology BSc (Hons)</td>
<td>B210</td>
<td>3 years</td>
</tr>
<tr>
<td>Tropical Disease Biology BSc (Hons)</td>
<td>C111</td>
<td>3 years</td>
</tr>
<tr>
<td>Zoology BSc (Hons)</td>
<td>C300</td>
<td>3 years</td>
</tr>
<tr>
<td>Biological Sciences leading to BSc (Hons) (4-year route with Foundation Year at Carmel College)</td>
<td>C108</td>
<td>4 (1+3) years</td>
</tr>
<tr>
<td>MBiolSci (Hons) integrated master's</td>
<td>C900</td>
<td>4 years</td>
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</table>

Degrees offered with other departments

<table>
<thead>
<tr>
<th>Program</th>
<th>UCAS Code</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation and Biodiversity BSc (Hons)</td>
<td>C192</td>
<td>3 years</td>
</tr>
<tr>
<td>Conservation and Biodiversity MEcol (Hons)</td>
<td>C180</td>
<td>4 years</td>
</tr>
<tr>
<td>Marine Biology BSc (Hons)</td>
<td>C160</td>
<td>3 years</td>
</tr>
<tr>
<td>Marine Biology MMarBiol (Hons)</td>
<td>C161</td>
<td>4 years</td>
</tr>
<tr>
<td>Marine Biology with Oceanography BSc (Hons)</td>
<td>C1F7</td>
<td>3 years</td>
</tr>
</tbody>
</table>

Foundation programmes have flexible entry requirements. Contact E: degree@carmel.ac.uk for details. See [www.liverpool.ac.uk/study/undergraduate/courses](http://www.liverpool.ac.uk/study/undergraduate/courses) for current entry requirements.

## Anatomy and Human Biology BSc (Hons)

**UCAS code: B110**

**Programme length: 3 years**

This is a practical, hands-on degree in Anatomy that allows you to combine a programme that includes cadaveric dissection with modules from medical and biological sciences. This degree will suit you if you want a thorough understanding of the structure and function of the human body. Our students are well prepared to compete for graduate entry into Medicine, Veterinary Medicine, Dental Sciences, Diagnostic Radiography and Physiotherapy, for higher degrees, and for careers in biological and medical science, archaeology, forensic science, palaeontology, sports science and teaching.

### Programme in detail

Each year includes dissection of the human body, working in groups of about seven (subject to the availability of prepared cadavers) guided by a series of related lectures and practical sessions in the Human Anatomy Resource Centre.

Lectures are given by top scientists in fields such as human evolution, vertebrate morphology, stem cell and developmental biology, musculoskeletal biology and cardiovascular biology. This is supported with topics that include physiology, pharmacology, neuroscience and practical skills.

Year Three includes the opportunity for a practical research project in one of the internationally renowned research groups working within the research institutes that support the teaching on the degree programme.
Key modules

Year One
Core modules
- Circulatory and respiratory anatomy
- Core concepts in anatomy
- Developmental biology
- Essential skills for life sciences I
- Evolution
- Experimental skills in current biology
- Grand challenges in biology
- Introduction to physiology and pharmacology
- Molecules and cells.

Year Two
Core modules
- Anatomy of the abdomen and pelvis
- Anatomy of the head and neck
- Essential skills for life sciences II
- Functional anatomy of the human locomotor system
- Functional neuroanatomy
- The multicellular organism.

Selected optional modules
Choose two typically from:
- Cell signalling in health and disease
- E-biology
- Endocrine and neuro-physiology
- Experimental physiology
- Evolutionary biology
- Practical human physiology
- Practical pharmacology
- Principles of pharmacology
- Techniques in cell biology.

Year Three
Core modules
- Advanced human topographical anatomy
- Advanced skills in anatomical science
- Research project.

Selected optional modules
Choose one typically from:
- Evolutionary and comparative anatomy
- Integrative and comparative animal physiology
- Neuromuscular physiology and disease
- The body in motion.

Choose three typically from:
- Becoming human: genomics, development and evolutionary anthropology
- Integrative comparative animal physiology
- Specialised body systems – development, disease and regeneration
- Clinical, anatomical and cellular basis of neurological dysfunction
- The cardiovascular system in health and disease.

Year Four
Students can transfer into the C900 (MBiolSci) programme to complete a four-year integrated master’s. This offers industrial placements in UK or abroad (subject to performance).

See pages 24-33 for module descriptions.

Biochemistry BSc (Hons)

UCAS code: C700
Programme length: 3 years

Biochemistry is the study of molecular structures and interactions in living organisms. Biochemists seek to understand living organisms in terms of chemical reactions. If you have a natural curiosity for science and a proven understanding of biology and chemistry, coupled with a desire to learn how science can be exploited for the benefit of mankind, then you have a fascinating career ahead of you. Biochemists are in great demand by employers. This degree will provide you with the knowledge and skills that employers want in medical and agricultural research, the pharmaceutical and other biotechnology industries, as well as in education.

Programme in detail
What is the biochemical basis of disease?
How does DNA control our development, our metabolism and our personal characteristics?
How do enzymes work and how do hormones control biological function? These are just some of the fascinating questions addressed in this programme.

Continued over...
In Year Three you will have the opportunity to complete a project in one of our excellent research laboratories, in Life Sciences, in our Medical, Veterinary and Dental Schools or even in a local hospital. You will become proficient in IT and will use the latest software to retrieve and analyse data. Communication skills, scientific writing and oral presentation, together with a range of other employability skills are also taught, enabling you to present your findings effectively to a range of audiences.

**Key modules**

**Year One**

Core modules
- Biochemical and biomedical sciences
- Biochemical methods
- Biological chemistry
- Essential skills for life sciences I
- Evolution and biodiversity
- Experimental skills in current biology
- Grand challenges in biology
- Molecules and cells.

Selected optional modules
Choose one typically from:
- Animal biodiversity
- Applied genetic and molecular technologies
- Developmental biology
- Global environment
- Introduction to animal husbandry
- Introduction to physiology and pharmacology
- Microbiology.

**Year Two**

Core modules
- Advanced biochemical techniques
- Cell signalling in health and disease
- E-biology
- Essential skills for life sciences II
- From genes to proteins
- Molecular science
- Structure and dynamics of macromolecules
- Techniques in cell biology.

**Selected optional modules**

Choose two typically from:
- Biotechnology
- Genome organisation and maintenance
- The multicellular organism
- Regulatory and neuro-physiology
- The immune system in health and disease
- Principles of pharmacology.

**Year Three**

Core modules
- Advanced skills in biochemistry
- Biochemical messengers and signal transduction
- Gene expression and development
- Genes and cancer
- Molecular medicine
- Protein structure and organisation
- Research project.

**Year Four**

Students can transfer into the C900 (MBiolSci) programme to complete a four-year integrated master’s. This offers industrial placements in UK or abroad (subject to performance).

See pages 24-33 for module descriptions.

**Biological and Medical Sciences BSc (Hons)**

**UCAS code: C130**

**Programme length: 3 years**

This programme provides a broad-based education in life sciences related to medicine, and offers great flexibility of module choice so that you can follow your own particular interests. This programme is particularly suitable if you are intending to apply for graduate entry into medical or dental schools, but it also prepares you for a wide range of other careers including scientific research and the biotechnology and pharmaceutical industries.

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For up-to-date entry requirements and full module details see [www.liverpool.ac.uk/study/undergraduate/courses](http://www.liverpool.ac.uk/study/undergraduate/courses)
Programme in detail
In this programme you choose to study from a wide range of modules from a variety of medically-relevant disciplines including Physiology, Pharmacology, Biochemistry, Genetics, Microbiology and Tropical Disease Biology. What you study in Year One will determine which options you can take in Years Two and Three. A typical student chooses modules in the first two years that concentrate on physiology, pharmacology and cellular biochemistry. In the third year specific disease areas are covered in much greater detail.

Key modules

Year One
Core modules
- Biochemical and biomedical sciences
- Biochemical methods
- Biological chemistry
- Essential skills for life sciences I
- Evolution and biodiversity
- Experimental skills
- Grand challenges in biology
- Introduction to physiology and pharmacology
- Molecules and cells.

Year Two
Core modules
- E-biology
- Essential skills for life sciences II
- Techniques in cell biology.

Selected optional modules
Typically students take the following theory modules:
- Cell signalling in health and disease
- Principles of pharmacology
- Regulatory and neuro-physiology

Plus two typically from:
- Genome maintenance and organisation
- The immune system in health and disease
- Virology
- Drug action

And, two practical modules typically from:
- Advanced techniques in biochemistry
- Practical human physiology
- Practical pharmacology II.

Year Three
Core modules
- Advanced skills in biological and medical sciences
- Research project.

Selected optional modules
Students will take five modules typically from:
- Bacterial disease mechanisms
- Biochemical messengers
- Cancer pharmacology
- Cardiovascular and respiratory pharmacology
- Clinical and translational cancer medicine
- Genes and cancer
- Human and clinical genetics
- Molecular medicine
- Molecular toxicology
- Neuromuscular physiology and disease
- Parasitology
- Topics in global health
- Understanding disease
- Viral disease mechanisms.

Year Four
Students can transfer into the C900 (MBiolSci) programme to complete a four-year integrated master’s. This offers industrial placements in UK or abroad (subject to performance).

See pages 24-33 for module descriptions.
Biological Sciences BSc (Hons)
UCAS code: C100
Programme length: 3 years

Biological Sciences is the key science of the 21st century. It brings together ideas, techniques and information from all areas of biology – from ecology to the molecular sciences. This programme allows you to pursue your own areas of specific interest and to have an appreciation of the full range of the subject. However, should you decide sometime in the first two years that you wish to specialise, you can transfer to a number of programmes in the School of Life Sciences.

Programme in detail
A progressive series of field, laboratory and lecture modules cover most aspects of the Biological Sciences, with students able to select topics to match their interests. Modules are selected from over 50 offered within the School of Life Sciences. Typical topics include: evolution and biodiversity; animal biodiversity; genetics of higher organisms; fieldwork techniques; animal behaviour; marine resource exploitation; genes and development; physiological control systems; microbiology; and molecular biology.

In Year Three, field courses in Zoology and Ecology are available. You will also undertake a research project that you will choose from one of the various parts of the School to complement the lecture programme chosen for your Honours year. Each project gives an invaluable opportunity to see what real scientific research is like and to work alongside staff who are international authorities in their fields.

Key modules
Year One
Core modules
- Essential skills for life sciences I
- Evolution and biodiversity
- Experimental skills in current biology
- Grand challenges in biology
- Molecules and cells.

Selected optional modules
Students will take three typically from:
- Animal biodiversity
- An introduction to marine ecosystems
- Applied genetic and molecular technologies
- Biochemistry and biomedical sciences
- Biological chemistry
- Developmental biology
- Ecology and conservation
- Ecology and the global environment
- Introduction to animal husbandry
- Introduction to physiology and pharmacology
- Microbiology.

In addition to one typically from:
- Biochemical methods
- Field skills.

Year Two
Core modules
- Essential skills for life sciences II.

Selected optional modules
Choose from across the School’s provision, in consultation with the programme team.

Year Three
Core modules
- Advanced skills in biological sciences
- Research project.

Selected optional modules
Choose from across the School’s provision, in consultation with the programme team.

Year Four
Students can transfer into the C900 (MBiolSci) programme to complete a four-year integrated master’s. This offers industrial placements in UK or abroad (subject to performance).

Selected optional modules
You will take modules from your pathway of choice.

See pages 24-33 for module descriptions.
Bioveterinary Science BSc (Hons)  
UCAS code: D900  
Programme length: 3 years

This three-year programme will provide you with a wide knowledge of biological and animal sciences, practical techniques and transferable skills for careers allied to veterinary science, scientific research, conservation, animal welfare and the biotechnology and pharmaceutical industries.

Programme in detail  
The programme contains bespoke modules in Bioveterinary Science, in topics such as animal husbandry, veterinary form and function, veterinary parasitology and public health and veterinary epidemiology. Students also choose modules available in the School of Life Sciences, which include animal biodiversity, developmental biology, biodiversity practical skills, comparative animal physiology, animal behaviour and conservation biology.

There are several options available each year allowing the student to tailor their degree to fit with their strengths, interests and career aspirations. In the final year, all students have carry out an extended research project of their choice with an active research group. Various modes of teaching are used throughout the programme including lectures, practical classes, problem-based learning and guided study supported by our Virtual Learning Environment.

Key modules  
Year One  
Core modules  
- Animal biodiversity  
- Biochemical methods  
- Essential skills for life sciences I  
- Evolution  
- Experimental skills in current biology  
- Grand challenges in biology  
- Introduction to animal disease, epidemiology and public health  
- Introduction to animal husbandry  
- Introduction to animal infectious diseases  
- Molecules and cells.

Year Two  
Core modules  
- Advanced animal husbandry  
- Advanced techniques in zoology  
- Essential skills for life sciences II  
- Techniques in cell biology  
- Veterinary form and function  
- Veterinary parasitology and public health.

Selected optional modules  
Choose two theory modules typically from:  
- Cell signalling in health and disease  
- Comparative animal physiology  
- Evolutionary biology  
- Pathological basis of animal diseases  
- Regulatory and neuro-physiology  
- The immune system in health and disease  
- The multicellular organism.

Choose two practical modules typically from:  
- Advanced genetics techniques  
- Advanced techniques in animal behaviour, health and welfare  
- Advanced techniques in biochemistry  
- Animal behaviour  
- Biological techniques  
- E-biology  
- Laboratory identification of parasites and diagnosis of parasitism  
- Molecular science.

Year Three  
Core modules  
- Advanced skills in bioveterinary science  
- Animal nervous and musculoskeletal disorders  
- Biology of veterinary pathogens: lessons for disease control  
- Research project  
- Veterinary epidemiology and public health.

Selected optional modules  
Choose two modules typically from:  
- Conservation biology  
- Integrative comparative animal physiology  
- Current skills and topics in evolutionary biology  
- Current topics in animal behaviour  
- The body in motion.
Year Four
Students can transfer into the C900 (MBiolSci) programme to complete a four-year integrated master’s. This offers industrial placements in UK or abroad (subject to performance).

See pages 24-33 for module descriptions.

Genetics BSc (Hons)
UCAS code: C400
Programme length: 3 years

Genetics is at the cutting edge of modern biology and the fast pace of major new developments has made genetics an exciting field of study. Recent developments in genomics and biotechnology in particular, have led to huge advances in the fields of personalised medicine and genetic engineering; areas that have the potential to revolutionise how we treat and think about disease, how we produce crops and manufacture new biological materials. In short, modern genetics underpins all of biology. Whether your interests lie in medicine, cancer biology, evolution, biotechnology, plant genetics and food security or molecular biology, genetics has something to offer you.

Programme in detail
Our degree programme aims to give you an appreciation of the full range of genetics while also allowing you to peruse areas of specific interest. During the course of your degree you will study modules in human and clinical genetics, gene expression and development, evolutionary genetics and biotechnology and will also have the opportunity to select from a wide range of optional modules. You will be taught by members of staff who are at the forefront of medical genetics, plant genetics, evolutionary genetics and genomics and also by visiting experts in fields such as forensics.

The programme is taught by a mixture of lectures, workshops, seminars, tutorials, and laboratory courses, culminating in an extended research project in your third year. This is your chance to study an area of cutting edge genetics in depth, while getting a real taste of life in an active research environment.

Key modules
Year One
Core modules
- Applied genetic and molecular technologies
- Essential skills for life sciences I
- Evolution and biodiversity
- Experimental skills in current biology
- Grand challenges in biology
- Molecules and cells.

Selected optional modules
Choose two theory modules typically from:
- Animal biodiversity
- Biochemistry and biomedical sciences
- Developmental biology
- Introduction to physiology and pharmacology
- Microbiology.

Choose one practical module typically from:
- Biochemical methods
- Field skills.

Year Two
Core modules
- Advanced genetics techniques
- E-biology
- Essential skills for life sciences II
- Evolutionary biology
- From genes to proteins
- Molecular and medical genetics
- Molecular science.
Selected optional modules
Choose two theory modules typically from:
- Biotechnology
- Immunology
- Principles of pharmacology
- Structure/dynamics of macro molecules
- The multicellular organism
- Virology.

Choose one practical module typically from:
- Advanced biochemical techniques
- Advanced microbiological techniques
- Advances skills in zoology
- Techniques in cell biology.

Year Three
Core modules
- Advanced skills in genetics
- Current topics in evolutionary biology
- Gene expression and development
- Human and clinical genetics
- Research project.

Selected optional modules
Choose one typically from:
- Bacterial disease mechanisms
- Genome technology and evolution
- Molecular biology of cancer
- Viral disease mechanisms.

Year Four
Students can transfer into the C900 (MBiolSci) programme to complete a four-year integrated master’s. This offers industrial placements in UK or abroad (subject to performance).

See pages 24-33 for module descriptions.

Human Physiology BSc (Hons)
UCAS code: B120
Programme length: 3 years

Human Physiology is the science of how the body works and is one of the fundamental disciplines of modern medicine. Physiology investigates the interaction of molecules, cells, tissues and organs, and how these parts make up the whole body. Human Physiology at Liverpool has a focus on cellular and molecular mechanisms of disease. As you work through your degree here at Liverpool your knowledge of physiology will expand through learning from experts in their fields. There is an emphasis on integrating molecular, cellular, systems and whole body function, which distinguishes physiology from other life science degrees. This makes it very relevant for postgraduate study in medicine.

Some of the major research areas covered within Human Physiology at the University of Liverpool are neurodegenerative ageing and neuronal signalling, oncology, regenerative medicine and stem cell physiology not forgetting signalling in smooth muscle (in the Centre for Better Births).

Programme in detail
Our excellence in research provides the basis for a BSc Honours programme that aims to provide a supportive learning environment. Students are enabled to develop academic competence at the highest level attainable, and are introduced to the forefront of current knowledge in human physiology.

We are keen to recruit students with a strong interest in biology/human biology, whether they intend to follow a career in medicine or dentistry, as a research physiologist or simply wish to take their fascination for human biology/biology further.
Our practical modules cover experimental and human physiology, and our lecture modules include neuroscience, regulatory physiology, neuromuscular physiology, perspectives in physiology research and cell signalling in health and disease. The schedule for the final year human physiology projects allows our students to immerse themselves in their own specialised research for 10-weeks in an active clinical or research laboratory environment. We equip our graduates with a range of skills that prepares them for future employment in a wide range of careers both in and out of science.

You may wish to defer your graduation and take up the opportunity to continue your studies and follow our MBiolSci programme, so extending your degree by one year. In addition to this master’s opportunity there are also other postgraduate opportunities which include MSc, MRes or our prestigious Wellcome Trust four-year PhD programme that has run here at the University of Liverpool for over 20 years, which continues to provide one avenue for our human physiology graduates to embark on a research career.

**Key modules**

**Year One**

Core modules
- Biochemical methods
- Developmental biology
- Essential skills for life sciences I
- Evolution and biodiversity
- Experimental skills in current biology
- Grand challenges in biology
- Introduction to physiology and pharmacology
- Molecules and cells.

Selected optional modules
Choose one typically from:
- Applied genetic and molecular technologies
- Biochemical and biomedical sciences
- Biological chemistry
- Microbiology.

**Year Two**

Core modules
- Cell signalling in health and disease
- E-biology
- Endocrine and neuro-physiology
- Essential skills for life sciences II
- Experimental physiology
- Practical human physiology
- Techniques in cell biology
- The immune system in health and disease
- The multicellular organism.

Selected optional modules
Choose one theory module typically from:
- Comparative animal physiology
- From genes to proteins
- Molecular and medical genetics
- Principles of pharmacology.

**Year Three**

Core modules
- Advanced skills for physiologists
- Cell signalling in health and disease
- Data handling for physiologists
- Membrane trafficking in health and disease
- Neuromuscular physiology and disease
- Principles of molecular physiology research
- Research project.

**Year Four**

Students can transfer into the C900 (MBiolSci) programme to complete a four-year integrated master’s. This offers industrial placements in UK or abroad (subject to performance).

See pages 24-33 for module descriptions.
Microbiology BSc (Hons)
UCAS code: C500
Programme length: 3 years

In spite of their size, the impact of microbes on the planet is so extensive that life as we know it could not exist without them. In addition, microbes cause many of the known diseases of humans, animals and plants. Knowledge of microbiology will enable you to improve the quality of our lives in relation to the environment, to fight disease, and to combat pollution. Microbiology plays a key role in genetic engineering and other modern biotechnologies, such as antibiotic production and the exploitation of new sources of food and energy.

Programme in detail
This programme covers a broad range of topics, with in-depth knowledge of both natural processes and human affairs. You will study modules such as microbial diversity and versatility, biotechnology, microbial disease and virology.

You will be able to identify individual species and grow them in pure culture, using aseptic techniques so that they can be safely handled and examined by microbiological methods. Project work will include the use of specialised research equipment alongside the members of the Microbiology Research Group and members of other departments, including medical and veterinary microbiologists in the Institute of Infection and Global Health and the Liverpool School of Tropical Medicine.

Key modules

Year One
Core modules
- Biochemical methods
- Essential skills for life sciences I
- Evolution and biodiversity
- Experimental skills
- Grand challenges in biology
- Microbiology
- Molecules and cells.

Selected optional modules
Choose two typically from:
- Applied genetic and molecular technologies
- Biochemistry and biomedical sciences
- Introduction to animal disease, epidemiology and public health.

Year Two
Core modules
- Advanced microbiological techniques
- Biotechnology
- Essential skills for life sciences II
- Techniques in cell biology
- Virology.

Selected optional modules
Choose three theory modules typically from:
- Cell signalling in health and disease
- From genes to proteins
- Genome organisation and maintenance
- The immune system in health and disease.

Choose two practical modules typically from:
- Advanced genetics techniques
- E-biology
- Molecular science
- Practical skills in tropical diseases.

Year Three
Core modules
- Advanced biotechnology
- Advanced skills in microbiology
- Bacterial disease mechanisms
- Microbial diversity and versatility
- Research project
- Viral disease mechanisms.

Selected optional modules
Choose one typically from:
- Genome biology and technology
- Human parasitology.

Year Four
Students can transfer into the C900 integrated master’s (MBiolSci) programme in Year Four. This offers industrial placements in UK or abroad (subject to performance).

See pages 24-33 for module descriptions.
Pharmacology BSc (Hons)
UCAS code: B210
Programme length: 3 years

Pharmacology is an exciting branch of experimental science concerned with drugs and how they work in the fight against disease. You can be part of the UK’s largest Pharmacology department by studying at the University of Liverpool. Taught by leading academics who are active researchers in their fields in a rich and vibrant environment, you will study the physiological and biochemical processes underlying diseases such as AIDS, malaria, asthma, cancer, cardiovascular and neurological disease, and learn how drug molecules can be designed to relieve symptoms and combat the disease process. This course provides an advanced programme using different forms of teaching, including lecture-based study of classical pharmacology, physiology, cell biology, biochemistry, molecular toxicology, cancer pharmacology, and many others. You will take part in small group tutorials, practical classes, and conduct an original research project and a library dissertation on two topics that are the subject of active research in the department. Our local, national and international links with other leading academic institutions as well as industry will provide you with exposure to a wealth of opportunities.

Furthermore, the practical nature of the degree means you will be better prepared to apply for careers in research, including graduate entry to medical school or into a PhD or master’s programme. Our graduates move into careers in various sectors, which include large and small pharmaceutical and biotech industries and academic research, both nationally and internationally.

Programme in detail
The Pharmacology programme provides an advanced programme of study that includes modules in pharmacology, physiology, cell biology, biochemistry and molecular biology. In the final year, you will study pharmacology full-time, learning the most up-to-date pharmacological concepts and knowledge from a practical viewpoint.

You will participate in lectures on topics such as cardiovascular and respiratory pharmacology, molecular and neuropharmacology, drug metabolism, chemotherapy and molecular toxicology. You will take part in tutorials and practical classes and conduct an original research project and library dissertation on a topic that is the subject of active research in the Department.

Key modules
Year One
Core modules
- Biochemical methods
- Biological chemistry
- Essential skills for life sciences I
- Evolution
- Experimental skills in current biology
- Grand challenges in biology
- Introduction to physiology and pharmacology
- Molecules and cells.

Selected optional modules
Choose one typically from:
- Animal biodiversity
- Applied genetic and molecular technologies
- Biochemistry and biomedical sciences
- Developmental biology
- Microbiology.

Year Two
Core modules
- Chemical techniques
- Drug action
- Essential skills for life sciences II
- Pharmacological chemistry
- Practical pharmacology I
- Practical pharmacology II
- Principles of pharmacology.
Selected optional modules
Choose two theory modules typically from:
● Cell signalling in health and disease
● Genome organisation and maintenance
● Regulatory and neuro-physiology
● The immune system in health and disease
● The multicellular organism.

Choose one practical module typically from:
● Advanced biochemical techniques
● E-biology
● Experimental physiology
● Molecular science
● Practical human physiology techniques in cell biology.

Year Three
Core modules
● Cancer pharmacology
● Cardiovascular and respiratory pharmacology
● Chemotherapy and cellular pharmacology
● Drug metabolism and drug response
● Molecular and neuropharmacology
● Molecular toxicology
● Research project.

Year Four
Students can transfer into the C900 (MBiolSci) programme to complete a four-year integrated master’s. This offers industrial placements in UK or abroad (subject to performance).

See pages 24-33 for module descriptions.

Tropical Disease Biology BSc (Hons)
UCAS code: C111
Programme length: 3 years

This programme will appeal to students who are interested in a range of aspects of the biology of infectious disease in a global context, but with an emphasis on the tropics. A practical skills module in tropical disease biology will be offered in Year Two.

Programme in detail
Year Three is based in the Liverpool School of Tropical Medicine where the focus is on parasitic protozoa and helminths. Modules include topics on parasitology (including immunology and molecular biology), vector biology, chemotherapy, topics in global health, and a research project.

A range of current issues will be highlighted, including emerging diseases and the feasibility of disease eradication programmes in the tropics.

In addition, students will develop core transferable skills (spoken and written communication, team working, project management and computing) and carry out a major research project.

**Key modules**
Year One
Core modules
● Biochemical and biomedical sciences
● Essential skills for life sciences I
● Evolution and biodiversity
● Experimental skills in current biology
● Grand challenges in biology
● Introduction to physiology and pharmacology
● Microbiology
● Molecules and cells.

Selected optional modules
Choose one theory module typically from:
● Biochemical methods
● Field skills.

Year Two
Core modules
● Advanced microbiological techniques
● Essential skills for life sciences II
● Practical skills in tropical disease biology
● Principles of pharmacology
● The immune system in health and disease
● Veterinary parasitology and public health
● Virology.

Selected optional modules
Choose one theory module typically from:
● Biotechnology
● Cell signalling in health and disease
● Comparative animal physiology
● From genes to proteins
● Genome organisation and maintenance
● Regulatory and neuro-physiology
● The multicellular organism.
Choose two practical modules typically from:
- E-biology
- Evolutionary biology
- Molecular science
- Tropical field course
- Techniques in cell biology.

**Year Three**

**Core modules**
- Advanced skills tropical disease biology
- Chemotherapy of parasitic disease
- Parasitology
- Research project
- Topics in global health
- Vector biology: theory, research and implementation.

**Selected optional modules**
Choose one typically from:
- Advanced biotechnology
- Bacterial disease mechanisms
- Cell signalling and signal transduction
- Conservation biology
- Drug metabolism and drug response
- Molecular medicine
- Veterinary epidemiology and public health
- Viral disease mechanisms.

**Year Four**

Students can transfer into the C900 (MBiolSci) programme to complete a four-year integrated master’s. This offers industrial placements in UK or abroad (subject to performance).

See pages 24-33 for module descriptions.

**Zoology BSc (Hons)**

**UCAS code: C300**

Programme length: 3 years

Zoology is the study of animal life, from whole animals and populations through tissues to their cells and molecular structures. Zoologists are concerned with the conservation of biodiversity. They also look at the behavioural patterns of animals, animal diseases and how they survive in their natural habitats. Zoology graduates find work for example in zoos, in wildlife conservation and management, in wildlife documentary or they go on to study Veterinary Science.

**Programme in detail**

We aim to provide you with a broad base of animal knowledge, with the opportunity to specialise later on. Specialist topics include animal behaviour, conservation biology, ecology and animal physiology.

In addition, students will develop core transferable skills (spoken and written communication, team working, project management and computing) and carry out a major research project.

You will visit zoologically rich locations during field courses and fieldwork projects. Fieldwork projects can be carried out in a wide range of habitats including the Wirral and Chester Zoo. Residential field courses are part of the Year One and Year Three syllabus. These are held in the southern Lake District and in the South of France. In addition, you have the opportunity to take a tropical field course to Uganda in Year Two.

**Key modules**

**Year One**

**Core modules**
- Animal biodiversity
- Ecology and the global environment
- Essential skills for life sciences I
- Evolution and biodiversity
- Experimental skills
- Field skills
- Grand challenges in biology
- Molecules and cells.

**Selected optional modules**
- Developmental biology
- Introduction to animal husbandry
- Marine ecosystems.

**Year Two**

**Core modules**
- Advanced experimental design and analysis
- Advanced techniques in zoology
- Animal behaviour
- Biodiversity practical skills
- Comparative animal physiology
- Essential skills for life sciences II
- Evolutionary biology
- Population and community ecology.
Selected optional modules
Choose one theory module typically from:
- Advanced animal husbandry
- E-biology
- Human impacts on marine ecosystems
- Multicellular organisms
- Techniques in cell biology
- Tropical field course
- Veterinary form and function
- Veterinary parasitology and public health.

Year Three
Core modules
- Advanced skills in zoology
- Research project
- Zoology field course.

Selected optional modules
Choose four theory modules typically from:
- Advanced topics in ecology
- Conservation biology
- Current topics in animal behaviour
- Evolution
- Integrative and comparative animal physiology
- Primate biology
- Veterinary epidemiology and public health.

Year Four
Students can transfer into the C900 (MBiolSci) programme to complete a four-year integrated master’s. This offers industrial placements in UK or abroad (subject to performance).

See pages 24-33 for module descriptions.

Biological Sciences leading to BSc (Hons) (4-year route with Foundation Year at Carmel College)
UCAS code: C108
Programme length: 4 (1+3) years

Intended for adult learners or undergraduates who wish to take up Biology but do not have the appropriate subject background, Biological Sciences offers a foundation year at nearby Carmel College.

This is not a programme in itself but acts as a springboard onto other Life Science degrees. This deferred choice programme means that you have the flexibility and freedom to switch to your chosen degree after completing the foundation year (Year Zero).

The aim of this programme is to make you an expert in one particular field with the ability to cross discipline boundaries, a highly attractive prospect to employers.

Programme in detail
Year Zero comprises introductory modules taught at Carmel College. Years One, Two and Three will continue at Liverpool following the chosen area of interest through to BSc (Hons) or MBiolSci (Hons) completion.

Programme options are:
- Biochemistry (C700)
- Biological and Medical Sciences (C130)
- Biological Sciences (C100)
- Genetics (C400)
- Human Physiology (B120)
- Microbiology (C500)
- Pharmacology (B210)
- Tropical Disease Biology (C111)
- Zoology (C300).

Further information about progression subjects can be found at www.carmel.ac.uk/courses/44/Biological-Sciences

Year Zero
You will be based at Carmel College in St Helens, about nine miles from the main University campus. Carmel College offers small class sizes and high standards of academic achievement. The programme, which is moderated by University staff, comprises introductory modules in biology, applications of biology and mathematics, plus either chemistry or geography.

Programme Year One
You will join students on your chosen degree at the main campus. For details please see individual programme listings within this brochure or online at www.liverpool.ac.uk/study/undergraduate/courses

Biological Sciences MBiolSci
UCAS code: C900
Programme length: 4 years

This is a four-year integrated master’s programme aimed at developing enhanced research and personal skills for students seeking a high-level career in research (eg studying for a PhD or working in industry).

Continued over...
For the first three years of study, students will select one of the available pathways (Anatomy and Human Biology, Biochemistry, Bioveterinary Science, Genetics, Microbiology, Pharmacology, Human Physiology, Tropical Disease Biology, Zoology, Biological and Medical Sciences or Biological Sciences) and will study a mix of theory and practical modules appropriate to the BSc Honours programmes for these areas. Students in three year programmes can transfer into C900 for a fourth year, subject to performance.

During the fourth (master’s) year, students will take advanced modules to enhance further their research and personal skills and will join a research team to undertake a significant research project. Students will also have the opportunity for a research internship in the UK or overseas, or to spend time working in industry in this final year. This course is accredited by the Royal Society of Biology (Advanced Accreditation) www.rsb.org.uk

Programme in detail
The MBiolSci programme consists of four years of study. For the first three years, students will follow a pathway that constitutes one of our current three-year BSc Honours degree programmes.

These are Anatomy and Human Biology (B110), Biochemistry (C700), Biological and Medical Sciences (C130), Bioveterinary Science (D900), Biological Sciences (C100), Genetics (C400), Microbiology (C500), Pharmacology (B210), Human Physiology (B120), Tropical Disease Biology (C111) or Zoology (C300).

In Year Four, students will take the core modules, research methods and applications in biological sciences and a choice between Advanced statistics for biological research and Informatics for Life Sciences, together with a 60-credit research project. In addition, students will take either a 30-credit internship undertaken as a placement in the summer period between years Three and Four, or a total of 30 credits of other M level modules. These internships may be in the UK or in our partner institutions abroad, for instance in Thailand or China. Students also have the opportunity to spend part or all of the final year gaining practical experience, for example, in industry or the NHS. The title of your degree award will reflect your pathway of choice eg Master in Biological Sciences (Biochemistry).

Key modules
Year One
Core modules
Students should take core and optional modules from the pathway of choice.

Year Two
Core modules
Students should take core and optional modules from the pathway of choice.

Year Three
Core modules
Students should take core and optional modules from the pathway of choice.

Year Four
Core modules
- Research methods and applications in biological sciences
- Advanced statistics for biologists
- OR
- Informatics for life sciences.

Selected optional modules
Choose from:
- Summer research internship.

Or 30 credits typically from:
- Advanced topics in animal behaviour
- Advanced topics in biotechnology
- Advanced topics in cell signalling
- Advanced topics in comparative physiology
- Advanced topics in microbial diversity and versatility
- Advanced topics in molecular medicine
- Advanced topics in viral disease mechanisms
- Cell and molecular biology of cancer
- Evolution and behaviour
- Post-genome bioinformatics
- Programming for life sciences.

See pages 24-33 for module descriptions.
Degrees offered with other departments

**Conservation and Biodiversity BSc (Hons)**
**UCAS code:** C192  
**Programme length:** 3 years

Our planet’s biodiversity is facing profound challenges which require a supply of skilled and qualified graduates in the environmental sector. Our programmes cover key ecological concepts and practical skills, with as much fieldwork as possible and an emphasis on applied science and conservation.

Our four-year integrated master’s programme (C180) is designed to train high-performing students to the best possible standard to prepare them for PhD research and employment.

For more information download the Earth, Ocean and Ecological Sciences brochure from www.liverpool.ac.uk/study/undergraduate/courses/publications

**Conservation and Biodiversity MEng (Hons)**
**UCAS code:** C182  
**Programme length:** 4 years

**Marine Biology BSc (Hons)**
**UCAS code:** C160  
**Programme length:** 3 years

From microscopic algae to giant whales, most of our planet’s life is found in the oceans. As a marine biologist, you will learn about the behaviour, physiology, and ecology of marine organisms, and how marine food webs are influenced by global warming and fisheries. We produce highly employable marine biologists, able to apply their knowledge and skills to fields including monitoring, pollution, conservation, and aquaculture.

Our four-year integrated master’s programme (C161) is designed to train high-performing marine biologists to the best possible standard to prepare them for PhD research and employment.

For more information download the Earth, Ocean and Ecological Sciences brochure from www.liverpool.ac.uk/study/undergraduate/courses/publications

**Marine Biology with Oceanography BSc (Hons)**
**UCAS code:** C1F7  
**Programme length:** 3 years

Life first emerged in the ocean and has spread throughout this dynamic environment. The distribution, growth and success of marine organisms is affected by the interaction of biological, chemical and physical processes operating in the ocean. You will study the interaction between the biology of marine organisms, the composition and properties of seawater and the physical processes operating in the oceans.

There is a strong emphasis on marine sustainability and ecosystem management, marine biogeochemistry, the climate system and numerical skills. Training at sea, in the field, and in the laboratory in Years One, Two and Three will provide you with the essential skills required to be a successful marine scientist including practical experience of data collection and processing, analysis and interpretation.

For more information download the Earth, Ocean and Ecological Sciences brochure from www.liverpool.ac.uk/study/undergraduate/courses/publications

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**www.liverpool.ac.uk/lifesciences**

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<thead>
<tr>
<th>Module title</th>
<th>Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal biodiversity</td>
<td>2</td>
<td>15</td>
<td>Fosters an understanding of structure and function of the basic body plan of the major groups of animals.</td>
</tr>
<tr>
<td>Applied genetic and molecular technologies</td>
<td>2</td>
<td>15</td>
<td>Provides the knowledge and understanding of the structure of nucleic acids and how these molecules encode the properties of cells; develops knowledge and understanding of the mechanisms that lead to inheritance in offspring; introduces the ethical implications of genetic and molecular technologies.</td>
</tr>
<tr>
<td>Biochemistry and biomedical sciences</td>
<td>2</td>
<td>15</td>
<td>Describes the major dietary components for humans and other organisms, and the processes that result in their digestion and absorption; explains the mechanisms and processes that regulate carbohydrate, fat and protein metabolism; defines how imbalances in nutrition can lead to lifestyle diseases and how genetic or infectious diseases can result in impaired ability to generate energy; and develops knowledge and understanding in biochemistry and biomedicine and ability to apply, evaluate and interpret this knowledge to solve problems.</td>
</tr>
<tr>
<td>Biochemical methods</td>
<td>2</td>
<td>7.5</td>
<td>Introduces a range of practical skills and analytical techniques that are applicable to many fields of modern biology.</td>
</tr>
<tr>
<td>Biological chemistry</td>
<td>2</td>
<td>15</td>
<td>This module aims to develop knowledge and understanding of the chemical reactions that underpin biological processes.</td>
</tr>
<tr>
<td>Circulatory and respiratory anatomy</td>
<td>2</td>
<td>15</td>
<td>Provides an understanding of the principal concepts underlying the cardiovascular, lymphatic and respiratory systems of the human body.</td>
</tr>
<tr>
<td>Core concepts in anatomy</td>
<td>1</td>
<td>7.5</td>
<td>Provides an introduction to topographical anatomy and neuroanatomy; introduces the key concepts of anatomy that underlie the main systems of the body; develops knowledge and understanding in human biology, and ability to apply, evaluate and interpret this knowledge to solve problems.</td>
</tr>
<tr>
<td>Developmental biology</td>
<td>2</td>
<td>15</td>
<td>Describes the processes that regulate B110, C700, development and the general properties C100, C400, of stem cells; explains the mechanisms of B210, B120, germ line development and fertilisation; C300 highlights the experimental evidence underpinning this knowledge of development and fertilisation; develops knowledge and understanding in human biology, and ability to apply, evaluate and interpret this knowledge to solve problems.</td>
</tr>
<tr>
<td>Ecology and global environment</td>
<td>2</td>
<td>15</td>
<td>Describes the physical and chemical contexts of the biosphere, the cycling of important elements at different scales, the distribution of biomes and the ecosystem concept.</td>
</tr>
<tr>
<td>Essential skills for life sciences I</td>
<td>1 and 2</td>
<td>15</td>
<td>Develops the essential skills that are required to be competent life scientists and enhances employability prospects.</td>
</tr>
</tbody>
</table>

Please note: modules may not be available across all programmes, please check programme specific module lists on pages 08-23.
<table>
<thead>
<tr>
<th>Module title</th>
<th>Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evolution</td>
<td>1</td>
<td>15</td>
<td>Introduces evolutionary concepts and theories; describes the genetic basis of evolutionary changes; describes interrelationships of life forms and biodiversity by descriptions of specialised biological systems and develops the knowledge and understanding of the subject and the ability to apply, evaluate and interpret this knowledge to solve problems in biology.</td>
</tr>
<tr>
<td>Experimental skills in current biology</td>
<td>1 and 2</td>
<td>15</td>
<td>Introduces a range of practical skills and techniques that are of general use across the life sciences.</td>
</tr>
<tr>
<td>Grand challenges in biology</td>
<td>1</td>
<td>7.5</td>
<td>Introduces the themes that are driving in biological research in Liverpool and globally.</td>
</tr>
<tr>
<td>Introduction to animal infectious disease, epidemiology and public health</td>
<td>2</td>
<td>15</td>
<td>The module will introduce the biology of a range of veterinary infectious diseases. Epidemiology and basic concepts in disease epidemiology, will be introduced and the effects/association diseases have on animals, society and the environment. You will be taught in small tutorial groups by research active teaching staff to develop information on a specific disease and present your group findings as a PowerPoint presentation at a &quot;mini-conference&quot;. The module is assessed through coursework and a final exam.</td>
</tr>
<tr>
<td>Introduction to animal husbandry</td>
<td>2</td>
<td>15</td>
<td>Introduces the present day structure of the agriculture industry; the seasonality of production of the various domesticated animal species, the breeds used and the management employed; the role of various crops and crop by-products as food sources; how crop, animal and mineral products are evaluated as foods for animals; the nutritional requirements of animals and how they are determined; how to assess and formulate rations to prevent poor performance, metabolic disease and toxicities; introductory theory of population genetics and their application to practical animal breeding; and to apply, evaluate and interpret problems in animal husbandry.</td>
</tr>
<tr>
<td>Introduction to physiology and pharmacology</td>
<td>2</td>
<td>15</td>
<td>Provides a grounding in the concepts and principles that underlie human systems biology and introduces the concepts of interactions of drugs and other exogenous chemicals on biological processes.</td>
</tr>
<tr>
<td>Microbiology</td>
<td>2</td>
<td>15</td>
<td>Describes how microbes play crucial roles in maintaining the natural environment; explains the role of microbes in disease processes and how the immune system protects against infections; highlights the roles of microbes in biotechnological processes; and develops knowledge and understanding in microbiology, and ability to apply, evaluate and interpret this knowledge to solve problems in microbiology.</td>
</tr>
<tr>
<td>Molecules and cells</td>
<td>1</td>
<td>15</td>
<td>Explores the basic of structure, composition and function of cells; explains core concepts relating to the organisation and specialisation of eukaryotes, prokaryotes and viruses; and defines the cellular components involved in the regulation of key functions such as the generation of energy, movement, cell growth and division and differentiation.</td>
</tr>
</tbody>
</table>

Please note: modules may not be available across all programmes, please check programme specific module lists on pages 08-23.
## Core and selected optional modules overview

### Year Two

<table>
<thead>
<tr>
<th>Module title</th>
<th>Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced animal husbandry</td>
<td>1</td>
<td>15</td>
<td>Integrates knowledge of nutrition, reproduction, genetics and breeding, behaviour and welfare of domesticated animals, with an assessment of the environment.</td>
</tr>
<tr>
<td>Advanced biochemical techniques</td>
<td>2</td>
<td>7.5</td>
<td>Provides a practical training in a number of techniques used in biochemistry, including analysis of enzyme activity and stability and protein purification and analysis using chromatography and electrophoresis.</td>
</tr>
<tr>
<td>Advanced experimental design and analysis</td>
<td>2</td>
<td>7.5</td>
<td>Raises your competence and confidence in formulating and testing hypotheses and choosing the appropriate statistical analyses.</td>
</tr>
<tr>
<td>Advanced genetics techniques</td>
<td>2</td>
<td>7.5</td>
<td>Provides a practical training that will help you to carry out our projects in genetics.</td>
</tr>
<tr>
<td>Advanced microbiological techniques</td>
<td>2</td>
<td>7.5</td>
<td>Develops practical, research skills in microbiology by illustrating key concepts in microbiology.</td>
</tr>
<tr>
<td>Advanced techniques in animal behaviour, health and welfare</td>
<td>1</td>
<td>7.5</td>
<td>Develops your skills in animal handling and ability to assess the health and welfare of captive animals.</td>
</tr>
<tr>
<td>Advanced techniques in zoology</td>
<td>2</td>
<td>7.5</td>
<td>Provides you with practical experience of a number of techniques used in zoology.</td>
</tr>
<tr>
<td>Anatomy of the abdomen and pelvis</td>
<td>1</td>
<td>15</td>
<td>Develops the ability to understand the structural and functional anatomy of the human abdomen and pelvis; and describe the processes involved in the normal development and maturation of these structures, and following pathological changes.</td>
</tr>
<tr>
<td>Anatomy of the head and neck</td>
<td>2</td>
<td>15</td>
<td>Develops knowledge and understanding of the structural and functional anatomy of the human head and neck, and how these structures develop.</td>
</tr>
<tr>
<td>Animal behaviour</td>
<td>1</td>
<td>15</td>
<td>Provides an introduction to the fundamental evolutionary principles that explain a wide range of animal behaviours.</td>
</tr>
<tr>
<td>Biodiversity practical skills</td>
<td>1</td>
<td>7.5</td>
<td>Develops the ability to map taxonomic and evolutionary relationships; construct and use keys for taxonomy; dissect and observe the morphology of specific organ systems; and demonstrate knowledge and understanding of the subject and to apply, evaluate and interpret this knowledge to solve problems in biology.</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>2</td>
<td>15</td>
<td>Introduces the ways in which biology is utilised for commercial purposes; describes the production of antibiotics, biomass, single cell protein, biopolymers and vaccines; and develops knowledge and understanding in biotechnology, and the ability to apply, evaluate and interpret this knowledge to solve problems in biotechnology.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Module title</th>
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<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell signalling in health and disease</td>
<td>2</td>
<td>15</td>
<td>Gives an understanding of the molecular mechanisms that allow cells to communicate with each other; explains the general principles of these signalling mechanisms and then describe some of these in more detail; illustrates how defects in these signalling processes can result in a variety of diseases.</td>
</tr>
<tr>
<td>Comparative animal physiology</td>
<td>2</td>
<td>15</td>
<td>Describes the physiological problems encountered by animals in their natural environments, and how they are overcome.</td>
</tr>
<tr>
<td>E-biology</td>
<td>1 or 2</td>
<td>7.5</td>
<td>Provides a practical appreciation of the nature and significance of both the scientific and ethical dimensions of digital data.</td>
</tr>
<tr>
<td>Essential skills for life sciences II</td>
<td>1 and 2</td>
<td>15</td>
<td>Further develops the essential life science skills that are required to improve your study skills.</td>
</tr>
<tr>
<td>Evolutionary biology</td>
<td>1</td>
<td>15</td>
<td>Provides a modern framework for understanding how organisms evolve and the major transitions in evolution.</td>
</tr>
<tr>
<td>Experimental physiology</td>
<td>2</td>
<td>7.5</td>
<td>Provides you with an understanding of physiological regulatory mechanisms, their importance in maintaining homeostasis and the consequences of system malfunctions.</td>
</tr>
<tr>
<td>From genes to proteins</td>
<td>1</td>
<td>15</td>
<td>Gives knowledge and understanding of the mechanisms involved in gene expression and how these mechanisms are regulated in prokaryotic and eukaryotic cells; the ability to explain how post-translational modifications modify protein structure and function; and the ability to apply, evaluate and interpret this knowledge to solve problems in genetics.</td>
</tr>
<tr>
<td>Functional anatomy of the human locomotor system</td>
<td>1</td>
<td>15</td>
<td>Develops knowledge and understanding of the structural and functional anatomy of the human musculoskeletal system.</td>
</tr>
<tr>
<td>Functional neuroanatomy</td>
<td>2</td>
<td>15</td>
<td>Describes the structural organisation of the human nervous system, explaining how neuronal circuits are organised to control processes, the perception of sensations and the generation of movement and how advances in neuroimaging and micro anatomical technology have advanced our understanding of the human nervous system.</td>
</tr>
<tr>
<td>Laboratory identification of parasites and diagnosis of parasitism</td>
<td>2</td>
<td>7.5</td>
<td>Introduces the methodology currently used to detect parasitism, and to introduce of parasitism identification skills for the major parasites and disease vectors of medical and veterinary significance.</td>
</tr>
<tr>
<td>Molecular and medical genetics</td>
<td>2</td>
<td>15</td>
<td>Introduces the range of biological mechanisms that control the structure and stability of the genetic material.</td>
</tr>
<tr>
<td>Molecular science</td>
<td>1</td>
<td>7.5</td>
<td>Provides you with practical experience in a number of techniques used in molecular biology.</td>
</tr>
<tr>
<td>Pathological basis of animal diseases</td>
<td>2</td>
<td>15</td>
<td>Develops the ability to describe the haematological and immunological responses of animals in veterinary disease states.</td>
</tr>
<tr>
<td>Population and community ecology</td>
<td>2</td>
<td>15</td>
<td>Introduces you to the concepts and principles underlying the dynamic interactions between species within communities and populations.</td>
</tr>
</tbody>
</table>

Please note: modules may not be available across all programmes, please check programme specific module lists on pages 08-23.
### Core and selected optional modules overview

**Year Two (continued)**

<table>
<thead>
<tr>
<th>Module title</th>
<th>Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical human physiology</td>
<td>1</td>
<td>7.5</td>
<td>Equips you with the ability to apply appropriate statistical tools to define the normal range of physiological variables.</td>
</tr>
<tr>
<td>Practical pharmacology</td>
<td>1</td>
<td>7.5</td>
<td>Equips you with the ability to measure the effects of drugs on isolated tissues and their use in the study of drug/receptor interactions; measure the binding of drugs to receptors; appreciate the range of analytical techniques used in the measurement of drug distribution; and experience techniques for the measurement of: the effects of drugs on memory; mechanisms of drug toxicity; and toxicity on isolated cells.</td>
</tr>
<tr>
<td>Practical skills in tropical diseases</td>
<td>2</td>
<td>7.5</td>
<td>Enhances knowledge and understanding of the biology and control of parasites of medical importance, and their vectors.</td>
</tr>
<tr>
<td>Principles of pharmacology</td>
<td>1</td>
<td>15</td>
<td>Develops an understanding of the quantitative aspects of drug action on cellular receptors; and demonstrates the relationship between drug efficacy and chemical structure.</td>
</tr>
<tr>
<td>Structure and dynamics of macromolecules</td>
<td>1</td>
<td>15</td>
<td>Provides knowledge and understanding of the latest methodologies and techniques that are used to study the fine detail of macromolecules.</td>
</tr>
<tr>
<td>Techniques in cell biology</td>
<td>1</td>
<td>7.5</td>
<td>Trains you in microscopy, and the ability to use different microscopic techniques to analyse cell structure and function.</td>
</tr>
<tr>
<td>The immune system in health and disease</td>
<td>1</td>
<td>15</td>
<td>Develops knowledge of the immune system and its role in protection against disease.</td>
</tr>
<tr>
<td>The multicellular organism</td>
<td>1</td>
<td>15</td>
<td>Extends knowledge of the structure and function of fundamental tissues, such as epithelial and connective tissue and of specialised tissues.</td>
</tr>
<tr>
<td>Tropical field course</td>
<td>2</td>
<td>15</td>
<td>Introduces the ecology of tropical ecosystems and the field techniques used to study them, through staff-led field visits, seminars and student executed field studies.</td>
</tr>
<tr>
<td>Veterinary form and function</td>
<td>1</td>
<td>15</td>
<td>Explores the form and function of dogs with reference to large animals. Introduces the ability to explain the development, structure and function of key body systems in domestic species: reproductive/endocrine, nervous, musculoskeletal/locomotor, cardiovascular/respiratory and digestive/excretory.</td>
</tr>
<tr>
<td>Veterinary parasitology and public health</td>
<td>2</td>
<td>15</td>
<td>Describes the major parasitic diseases of companion and food producing animals and related parasites that impact on global human health.</td>
</tr>
<tr>
<td>Virology</td>
<td>1</td>
<td>15</td>
<td>Introduces the fundamental features and properties of viruses and viral infections; gives knowledge and understanding of the use and development of molecular biology technologies in virology and the capacity to describe problems associated with viruses and their control, and identify positive applications of viruses.</td>
</tr>
</tbody>
</table>

*Please note: modules are provided for information only and may change. Timetabling restrictions may apply.*
# Core and selected optional modules overview

## Year Three

<table>
<thead>
<tr>
<th>Module title</th>
<th>Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced biotechnology</td>
<td>1</td>
<td>15</td>
<td>Describes current approaches to exploit microorganisms and microbial processes in the context of modern developments in biotechnology.</td>
</tr>
<tr>
<td>Advanced human topographical anatomy</td>
<td>1</td>
<td>15</td>
<td>Enhances knowledge of a particular topographical region through dissection and greatly improve dissection skills.</td>
</tr>
<tr>
<td>Advanced skills and contemporary themes in anatomical sciences</td>
<td>1</td>
<td>15</td>
<td>Enables you to evaluate the latest scientific literature and technologies in anatomical science and topical ethical issues of particular concern to anatomists, and to apply these skills to report and essay writing.</td>
</tr>
<tr>
<td>Advanced skills in biochemistry</td>
<td>1 and 2</td>
<td>15</td>
<td>Develops science presentation skills in various formats and to various target audiences; enhances your ability to search, identify, apply, critically evaluate and interpret biochemical knowledge to solve complex problems. Provides advice, inspiration and guidance for career development and employability.</td>
</tr>
<tr>
<td>Advanced skills in biological and medical sciences</td>
<td>1 and 2</td>
<td>15</td>
<td>Enables you to evaluate the scientific literature; to apply these skills to presentations in various formats in groups and individually; and enhances your problem-solving skills; by data analysis exercises in relation to experimental methods in biological and medical sciences.</td>
</tr>
<tr>
<td>Advanced skills in biological sciences</td>
<td>1 and 2</td>
<td>15</td>
<td>Enables you to evaluate the scientific literature and to apply these skills to report and essay writing and develops enhanced presentational skills, both oral and poster, in groups or as individuals.</td>
</tr>
<tr>
<td>Advanced skills in bioveterinary science</td>
<td>1</td>
<td>15</td>
<td>Enables you to evaluate evidence from veterinary and animal industry related literature and industry reports to identify challenges and problems.</td>
</tr>
<tr>
<td>Advanced skills in genetics</td>
<td>1 and 2</td>
<td>30</td>
<td>Enables you to critically evaluate scientific information in the context of genetics, including that obtained from the published literature, research seminars and online genetic databases. Familiarises you with topical issues and ethical considerations in genetics and develop problem solving skills in relation to experimental, bioinformatics, medical and forensic methods in genetics.</td>
</tr>
<tr>
<td>Advanced skills in microbiology</td>
<td>1 and 2</td>
<td>15</td>
<td>Develops the skills necessary for using databases to solve problems in microbiology. Introduces current scientific methodologies and topical issues within microbiology and develops enhanced presentational skills.</td>
</tr>
<tr>
<td>Advanced skills in tropical disease biology</td>
<td>1</td>
<td>15</td>
<td>Provides training in a set of methodological skills required to undertake human studies.</td>
</tr>
<tr>
<td>Advanced skills in zoology</td>
<td>1 and 2</td>
<td>15</td>
<td>Encourages you to synthesise information from different sources within zoology, and to integrate skills and knowledge from across the curriculum.</td>
</tr>
</tbody>
</table>

*Please note:* modules may not be available across all programmes, please check programme specific module lists on pages 08-23.
# Core and selected optional modules overview

**Year Three (continued)**

<table>
<thead>
<tr>
<th>Module title</th>
<th>Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced topics in ecology</td>
<td>1</td>
<td>15</td>
<td>Describes modern approaches to long-standing ecological issues and introduces current research in the expanding areas of ecology.</td>
</tr>
<tr>
<td>Becoming human: genomics, development and evolutionary anthropology</td>
<td>2</td>
<td>15</td>
<td>Develops an understanding of the course of human evolution.</td>
</tr>
<tr>
<td>Biochemical messengers and signal transduction</td>
<td>2</td>
<td>15</td>
<td>Evaluates and describes the latest knowledge and ideas on how cells respond to external signals and how signalling information is transferred within and between cells.</td>
</tr>
<tr>
<td>Biology of veterinary pathogens: lessons for disease control</td>
<td>1</td>
<td>15</td>
<td>Provides you with an overview of the major veterinary diseases affecting livestock and small animals in the UK and in developing countries.</td>
</tr>
<tr>
<td>Cancer pharmacology</td>
<td>2</td>
<td>15</td>
<td>Explores cancer biology and novel approaches to cancer treatment.</td>
</tr>
<tr>
<td>Cardiovascular and respiratory pharmacology</td>
<td>1</td>
<td>15</td>
<td>Explores basic and clinical pharmacology of drugs used in cardiovascular and respiratory disease.</td>
</tr>
<tr>
<td>Cell signalling in health and disease</td>
<td>1</td>
<td>15</td>
<td>Describes advanced concepts that are fundamental to modern ideas in biophysics and cell signalling from a systems physiology perspective covering both physiology and disease.</td>
</tr>
<tr>
<td>Chemotherapy and cellular pharmacology</td>
<td>2</td>
<td>15</td>
<td>Looks at chemotherapy of infectious diseases caused by bacteria, viruses and parasites.</td>
</tr>
<tr>
<td>Chemotherapy of parasitic disease</td>
<td>2</td>
<td>15</td>
<td>Develops an understanding of current concepts of antiparasitic chemotherapy, with attention being directed at the major classes of anti-helmintics and antiprotozoal drugs.</td>
</tr>
<tr>
<td>Clinical, anatomical and cellular basis of neurological dysfunction</td>
<td>2</td>
<td>15</td>
<td>Complements and extends existing knowledge of CNS anatomy and biology to further understand the mechanisms which allow the brain function under normal physiological conditions but which can also lead to disease.</td>
</tr>
<tr>
<td>Conservation biology</td>
<td>2</td>
<td>15</td>
<td>Explores patterns of biodiversity and encourages you to critically evaluate the evidence that explains the demise of animal and plant species.</td>
</tr>
<tr>
<td>Current topics in animal behaviour</td>
<td>2</td>
<td>15</td>
<td>Develops an understanding of the use of evolutionary theory to understand animal behaviour.</td>
</tr>
<tr>
<td>Data handling for physiologists</td>
<td>2</td>
<td>15</td>
<td>Enhances the key skills acquired in Levels 4 and 5, including both scientific and broader employability skills.</td>
</tr>
<tr>
<td>Drug metabolism and drug response</td>
<td>1</td>
<td>15</td>
<td>Looks at drug metabolism, pharmacokinetics and drug response, and pharmacodynamics.</td>
</tr>
<tr>
<td>Evolutionary and comparative anatomy</td>
<td>1</td>
<td>15</td>
<td>Provides an overview of the evolutionary and comparative anatomy of the major vertebrate groups.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Module title</th>
<th>Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gene expression and development</td>
<td>1</td>
<td>15</td>
<td>Provides a systematic knowledge and critical understanding of how living organisms control their pattern of gene expression.</td>
</tr>
<tr>
<td>Genes and cancer</td>
<td>2</td>
<td>15</td>
<td>Develops understanding of how cancer occurs and the role of oncogenes and tumour suppressor genes in the development of human cancer.</td>
</tr>
<tr>
<td>Human and clinical genetics</td>
<td>1</td>
<td>15</td>
<td>Develops an advanced understanding of modern medical genetics by expanding on fundamental principles introduced at Level 5.</td>
</tr>
<tr>
<td>Integrative comparative animal physiology</td>
<td>1</td>
<td>15</td>
<td>Develops an understanding of the physiological mechanisms that underpin adaptations to environmental conditions.</td>
</tr>
<tr>
<td>Microbial diversity and versatility</td>
<td>1</td>
<td>15</td>
<td>Explains the diversity of microbial life and its adaptation to environment.</td>
</tr>
<tr>
<td>Molecular and neuropharmacology</td>
<td>2</td>
<td>15</td>
<td>Explores the pharmacology of drugs acting on central and peripheral nervous system pathways.</td>
</tr>
<tr>
<td>Molecular medicine</td>
<td>2</td>
<td>15</td>
<td>Describes the application of molecular and computational approaches in the study and treatment of human disease.</td>
</tr>
<tr>
<td>Molecular toxicology</td>
<td>2</td>
<td>15</td>
<td>Looks at molecular and cellular mechanisms involved in toxicology.</td>
</tr>
<tr>
<td>Neuromuscular physiology and disease</td>
<td>1</td>
<td>15</td>
<td>Describes the concepts that are fundamental to modern ideas in understanding the physiology of muscles, neurons and related diseases.</td>
</tr>
<tr>
<td>Parasitology</td>
<td>1</td>
<td>15</td>
<td>Provides you with knowledge of the major features of the structure and life histories of a range of protozoan and helminth parasites of humans.</td>
</tr>
<tr>
<td>Protein structure and organisation</td>
<td>1</td>
<td>15</td>
<td>Develops knowledge and understanding why protein structures are important for function, and how proteins fold into functional conformations.</td>
</tr>
<tr>
<td>Research project</td>
<td>1 and 2</td>
<td>30</td>
<td>Provides you with an insight into and experience of the process of scientific research and debate and develops the confidence to work independently and with others, to effectively and efficiently achieve a scientific aim.</td>
</tr>
<tr>
<td>The body in motion: musculoskeletal functioning in health, performance and disease</td>
<td>1</td>
<td>15</td>
<td>Provides an introduction to the biology (adaptations, ecology and evolution) of the major biological groups in our own order, that is primates.</td>
</tr>
<tr>
<td>The cardiovascular system in health and disease</td>
<td>2</td>
<td>15</td>
<td>Develops an understanding of important current research themes in cardiovascular biology, and show how such research informs understanding of the mechanisms underlying, and the treatment of, certain cardiovascular disorders.</td>
</tr>
<tr>
<td>Topics in global health</td>
<td>2</td>
<td>15</td>
<td>Enhances awareness of the global distribution of disease and the associated implications and inequalities. Enhances awareness of the global impact of poverty and the negative and positive impacts of human activity in the spread of disease.</td>
</tr>
</tbody>
</table>

Please note: modules may not be available across all programmes, please check programme specific module lists on pages 08-23.
Core and selected optional modules overview

Year Three (continued)

<table>
<thead>
<tr>
<th>Module title</th>
<th>Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vector biology – theory, research and implementation</td>
<td>1</td>
<td>15</td>
<td>Describes current research into vectors and vector-borne diseases.</td>
</tr>
<tr>
<td>Veterinary epidemiology and public health</td>
<td>2</td>
<td>15</td>
<td>Develops the ability to use epidemiological and statistical methods for research applications in bioveterinary sciences and animal sciences.</td>
</tr>
<tr>
<td>Viral disease mechanisms</td>
<td>2</td>
<td>15</td>
<td>Evaluates the latest research on the role of viruses as important pathogens of humans and animals. Explains in detail, viral virulence mechanisms, immune evasion and vaccine development.</td>
</tr>
<tr>
<td>Zoology field course</td>
<td>1</td>
<td>15</td>
<td>Develops proficiency in a range of field techniques, as well as team-working skills such as coordinating responsibility for collecting data using diverse techniques and sampling protocols.</td>
</tr>
</tbody>
</table>

Please note: modules may not be available across all programmes, please check programme specific module lists on pages 08-23.

Core and selected optional modules overview

Year Four

<table>
<thead>
<tr>
<th>Module title</th>
<th>Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced topics in biotechnology</td>
<td>1</td>
<td>15</td>
<td>Describes the exploitation of microorganisms and microbial processes for biotechnological applications; and discusses the economical and ethical aspects of the development of novel products and environmental benefits using biotechnological processes.</td>
</tr>
<tr>
<td>Advanced topics in cell signalling</td>
<td>2</td>
<td>15</td>
<td>Illustrates the importance of cellular responses to external signals and how signalling information is transferred within cells.</td>
</tr>
<tr>
<td>Advanced topics in comparative physiology</td>
<td>1</td>
<td>15</td>
<td>Provides you with an insight into physiological mechanisms underpinning adaptation to potentially hostile environmental conditions such as anoxia, toxic sulphide, high hydrostatic pressure and extreme temperatures.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Module title</th>
<th>Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced topics in microbial diversity</td>
<td>1</td>
<td>15</td>
<td>Explains the diversity of microbial life and its adaptation to environment.</td>
</tr>
<tr>
<td>and versatility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced topics in molecular medicine</td>
<td>2</td>
<td>15</td>
<td>Explores the application of molecular genetics and computational biology in the study and treatment of human disease.</td>
</tr>
<tr>
<td>Advanced topics in viral disease mechanisms</td>
<td>2</td>
<td>15</td>
<td>Describe the latest research on the role of viruses as important pathogens of humans and animals; explores, in detail, viral virulence mechanisms, immune evasion and vaccine development.</td>
</tr>
<tr>
<td>Cell and molecular biology of cancer</td>
<td>2</td>
<td>15</td>
<td>Provides a current, research-level, critical understanding of the key molecular and cellular changes that occur during the initiation and progression of cancer.</td>
</tr>
<tr>
<td>Informatics for life sciences</td>
<td>1</td>
<td>15</td>
<td>Provides a broad overview of the use of informatics in the biological sciences. It gives you a theoretical and technical grounding in a range of application areas including bioinformatics-related topics such as sequence analysis, phylogenetics, and the modelling of proteins; and higher level subjects such as modelling of pathways, ecosystems and evolution.</td>
</tr>
<tr>
<td>Programming for life sciences</td>
<td>1</td>
<td>15</td>
<td>This module is aimed at postgraduate students in the life sciences, wishing to learn about methods for use in data-intensive research. The module provides a broad overview of the use of a scripting language for performing basic tasks in the biological sciences, with examples demonstrated through the use of Perl. The module will give you practical experience in writing your own Perl scripts for basic bioinformatics tasks, such as manipulating DNA, RNA and protein sequences, file input/output and working with other programs, such as BLAST.</td>
</tr>
<tr>
<td>Research methods and applications in biological sciences</td>
<td>1 and 2</td>
<td>15</td>
<td>Provides you with an understanding of the processes required for the successful planning and delivery of research projects.</td>
</tr>
<tr>
<td>Research project</td>
<td>1 and 2</td>
<td>30</td>
<td>Provides you with an insight into and experience of the process of scientific research and debate and develops the confidence to work independently and with others, to effectively and efficiently achieve a scientific aim.</td>
</tr>
<tr>
<td>Summer research internship</td>
<td>1</td>
<td>30</td>
<td>Provides you with an insight into the process of scientific research and debate and exposes you to new research and cultural environments.</td>
</tr>
<tr>
<td>Viral disease mechanisms</td>
<td>2</td>
<td>15</td>
<td>Evaluates the latest research on the role of viruses as important pathogens of humans and animals. Explains in detail, viral virulence mechanisms, immune evasion and vaccine development.</td>
</tr>
</tbody>
</table>

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