

# Anatomy and Human Biology MBiolSci

## COURSE DETAILS

- A level requirements: [AAB](#)
- UCAS code: B112
- Study mode: Full-time
- Length: 4 years

## KEY DATES

- Apply by: [25 January 2023](#)
- Starts: 25 September 2023

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## Course overview

This is a practical, hands-on degree in anatomy that allows you to combine cadaveric dissection with a thorough exploration of human biology at all levels of organisation, from the DNA right up to organ systems.

## INTRODUCTION

This degree will suit you if you want a thorough understanding of the structure and function of the human body. Our BSc students are well prepared to compete for graduate entry into Medicine, Dentistry, Physician Associate studies, Radiotherapy, and Physiotherapy, for higher degrees in all areas of human biology, and for careers in anatomy, biological and medical science, the biotech, healthcare, and pharmaceutical industries, and in medical communications. The MBiolSci programme builds on the BSc experience by enhancing skills in research.

The MBiolSci is a four-year programme, in which students first follow the three-year BSc in Anatomy and Human Biology and then continue into a fourth year, subject to performance.

The fourth (Master's) year aims 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) or those seeking to enhance their qualification. Students take advanced modules and will join a research team to undertake a significant research project. Students can also apply for a six-week summer research internship in the UK or overseas or apply to spend time working in industry or in other enterprises in the final year.

### Programme in detail

Each year includes dissection of the human body, working in groups of typically five or six (subject to the availability of prepared cadavers) guided by a series of related lectures and practical sessions in the

Human Anatomy Resource Centre, our dedicated anatomy facility.

Alongside this, lectures, tutorials, and seminars are given by top scientists in fields such as neuroscience, human evolution, vertebrate morphology, stem cell

and developmental biology, musculoskeletal biology, and cardiovascular biology.

## **WHAT YOU'LL LEARN**

- Independent and collaborative work.
  - Self-management skills.
  - Problem-solving.
  - Practical skills combining cadaveric dissection with a thorough exploration of human biology.
  - Effective communication skills, orally and writing.
  - Able to use programming language for analysis and data visualisation.
  - Ability to evaluate and interpret the subject knowledge to solve problems
  - Research and communication skills
  - Analysis and interpretation of real-world data
  - How to access and critically evaluate scientific literature
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# Course content

Discover what you'll learn, what you'll study, and how you'll be taught and assessed.

## YEAR ONE

All modules of your first year of study are compulsory.

### COMPULSORY MODULES

#### MOLECULES AND CELLS (LIFE101)

**Credits: 15 / Semester: semester 1**

This module describes the detailed composition of cells and the processes by which they obtain and generate energy, grow, replicate and eventually die.

The lectures will be supplemented with on-line resources and illustrated with some of the latest research methods that are used to study cell structure and function.

Students will be given guided reading, and regular formative assessment exercises will enable students to evaluate their understanding of the module.

The module will be assessed by both continuous assessments and by a final examination.

#### EVOLUTION (LIFE103)

**Credits: 15 / Semester: semester 1**

This module describes the evolutionary processes that have resulted in the generation of the diverse life forms that populate the planet.

This includes the theory of evolution by natural selection, and the genetic processes that result in gene evolution and diversity.

Selected scenarios and case studies will apply evolutionary concepts, showing the fundamental importance of evolution to a broad range of the life sciences.

The module is split into two parts: the first part (A) is the same for all students, the second part (B) contains a number of parallel strands tailored to students interest.

Students will be advised by their programme director which strand to follow.

The lectures will be supplemented with a variety of on-line resources.

Students will be given guided reading, and regular formative assessment exercises will enable students to evaluate their understanding of the module.

The module will be assessed by continuous assessments.

#### GRAND CHALLENGES IN BIOLOGY (LIFE105)

**Credits: 7.5 / Semester: semester 1**

This module introduces students to how grand challenges (scientific and societal) are addressed in universities and in particular at the University of Liverpool. Students will be introduced to four major topics (Infections and Global Health, Ageing, Food Security, Personalised Medicines) by experts in the respective fields. Emphasis will be placed on students understanding concepts and assembling information rather than memorizing facts. The material will be delivered based on the concept of a scientific conference with plenary talks and parallel sessions presented by the lecturers, and (in light of Covid-19 driven procedures at scientific meetings) a video session driven by student input. Assessment of lecture material and associated readings will be by continuous assessment.

## **INTRODUCTION TO PHYSIOLOGY AND PHARMACOLOGY (LIFE106)**

**Credits: 15 / Semester: semester 2**

## **EXPERIMENTAL SKILLS IN CURRENT BIOLOGY (LIFE107)**

**Credits: 15 / Semester: whole session**

This is the first practical module that students will take in the School of Life Sciences. The skills that students acquire will be needed for other practical modules that they will take in semester 2 Year 1, and during Year 2 and will prepare them for their year 3 research project and for their subsequent career.

This module is designed to teach the basic multidisciplinary skills required in the biological sciences.

It aims to develop careful working practices, experimental design and interpretation of results. Skills acquired in this module will be both utilised and enhanced by the co-requisite module LIFE 109 (communication and study skills and quantitative skills).

The way in which LIFE 107 is taught and assessed is designed to place emphasis on encouraging students to take responsibility for their own learning. Demonstrators and academic staff will be on hand to answer questions or show students how to use lab equipment.

Resources will be available online via VITAL and include a weekly Blog, technical manual, module handbook, lab instruction manual and weekly lectures.

The module will be taught in weekly practical classes and it will be assessed through continuous assessment (assessment 1-2) and a final exam (assessment 3).

## **CORE CONCEPTS OF ANATOMY (LIFE111)**

**Credits: 7.5 / Semester: semester 1**

This module provides an introduction to topographical anatomy and neuroanatomy.

The aim is to introduce the students to the key concepts of anatomy that underlie the support, movement and coordination systems of the body.

The lectures will be supplemented with on-line resources.

Students will be given guided reading, and regular formative assessment exercises will enable students to evaluate their understanding of the module.

The module will be assessed by both a continuous assessment and a final examination.

### **QUANTITATIVE SKILLS FOR THE LIFE SCIENCES (LIFE113)**

**Credits: 7.5 / Semester: semester 1**

For any student studying the Biological Sciences a firm grasp of quantitative skills is an absolute necessity. This module will provide you with the knowledge and skills you need to manipulate numbers and analysis/visualise data using digital tools. The module emphasises a "learn by doing" approach to the development of quantitative skills and is heavily workshop based.

### **CIRCULATORY AND RESPIRATORY ANATOMY (LIFE116)**

**Credits: 15 / Semester: semester 2**

This module introduces the students to the study of regional anatomy.

Through the use of dissection of the thorax and lectures the students will understand the functional anatomy behind the circulatory and respiratory system.

The students will also be exposed to the study of embryology by discovering how the thorax develops from conception to adulthood.

This module is taught through lectures and practical dissections and it is assessed by an in-course spotter assessment and a final written exam. Formative on-line quizzes will take place throughout the semester to aid student understanding.

Finally by the time the students have finished this module they will be proficient in their dissection skills, an ability that will serve them well in the rest of the programme and perhaps beyond.

### **INTRODUCTION TO GENETICS AND DEVELOPMENT (LIFE128)**

**Credits: 15 / Semester: semester 2**

This module introduces students to modern genetics and developmental biology at an introductory level. Using examples taken from across the biosciences and medicine, students will develop their understanding of the inheritance of genetic traits, how mutation can lead to disease and the molecular techniques used to study genes. They will also be introduced to development from meiosis and germ cell formation through to organogenesis, emphasising both the underlying genetic and molecular mechanisms involved and the embryological processes. Students will explore current advances in both fields including current and potential use of gene editing techniques and stem cells in therapeutics, and will consider the ethical implications of these advances.

The module is taught through a combination of lectures and workshops incorporating problem solving and discussion, with an emphasis on an appreciation of the techniques and experimental evidence underpinning the material. Assessment is by a combination of a written examination and a group ethics poster presentation.

### **COMMUNICATION AND STUDY SKILLS FOR THE LIFE SCIENCES (LIFE130)**

**Credits: 7.5 / Semester: whole session**

*Programme details and modules listed are illustrative only and subject to change.*

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## **YEAR TWO**

(Total required credits are 120)

The compulsory modules are indicated below, and amount to 60 credits, plus LIFE223 Essential Skills for Life Scientists that continues over both semesters, and is worth 15 credits. The remaining credits must be made up by choosing two further 15 credit

optional modules and two practical modules (worth 7.5 credits each) to make up the total of 120 credits. The choices are detailed below. Note that odd numbered modules run in semester one and even numbered modules run in semester two.

### **COMPULSORY MODULES**

#### **ANATOMY OF THE ABDOMEN AND PELVIS (LIFE235)**

**Credits: 15 / Semester: semester 1**

This module aims to develop in students a knowledge and understanding of the structural and functional anatomy of the human abdomen and pelvis, and the processes involved in the development and maturation of these structures. The module is delivered by a series of lectures and practical sessions, the latter of which will take place in the Human Anatomy Resource Centre (HARC). The lectures will be supplemented with online resources. Students will be given guided reading, and regular formative assessment exercises will enable students to evaluate their understanding of the module. The module will be assessed by both continuous assessment and by a final examination.

#### **ANATOMY OF THE HEAD AND NECK (LIFE220)**

**Credits: 15 / Semester: semester 2**

This module aims to develop students' knowledge and understanding of the structural and functional anatomy of the human head and neck and to encourage students to develop skills for continuous learning, using the practical resources available to them and to work independently. The module is delivered by a series of lectures and practical sessions. The lectures will be supplemented with on-line resources. Students will be given guided reading and regular formative assessment exercises will enable students to evaluate their understanding of the module and give students effective feedback. The module will be assessed by both continuous assessment and a final written examination.

#### **ESSENTIAL SKILLS FOR THE LIFE SCIENCES 2 (LIFE223)**

**Credits: 15 / Semester: whole session**

This module will continue, extend, and broaden the transferable skills developed in Year 1. It will focus on improving the students' analytical, communication, quantitative, and employability skills. The communication skills component is assessed through a portfolio whereas the quantitative skills component is assessed through a group poster and SAQ.

## **FUNCTIONAL ANATOMY OF THE HUMAN LOCOMOTOR SYSTEM (LIFE219)**

**Credits: 15 / Semester: semester 1**

This module provides a detailed overview of the human musculoskeletal system and associated nerve/blood supply (focussing on upper and lower limbs and back).

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72.0pt;}div.WordSection1{page:WordSection1;} It aims to enhance students' knowledge and understanding of muscle and joint functioning during various activities. The module is delivered by a series of lectures and practical sessions. The lectures will be supplemented with online resources (e.g. on VITAL, as well as extra online publicly available anatomy resources that may be useful). Students will be given guided reading, and regular formative assessment exercises will enable students to evaluate their understanding of the module. The module will be assessed by both practical and written examinations.

## **FUNCTIONAL NEUROANATOMY (LIFE218)**

**Credits: 15 / Semester: semester 2**

This module describes the structural organisation of the human nervous system by taking a functional approach.

It examines how neuronal circuits are organised to control processes ranging from simple reflex activity to complex emotions, such as anger and fear. It also describes their organisation into whole systems, controlling the perception of sensations (such as tactile touch and pain) and the generation of movement (from stereotyped walking patterns to intricate skills).

The module discusses areas of the brain that control cognitive functions such as memory, speech, reasoning and abstract thought. It concludes by examining how the brain is nourished (blood supply) and protected (meninges, cerebrospinal fluid), and by examining the latest neuroimaging and microanatomical techniques to explore the brain structure and functioning.

Students will be given guided reading, and regular formative assessment exercises will enable students to evaluate their understanding of the module.

The module comprises lectures and practical sessions, and will be assessed by both continuous assessments and by a final examination.

## **OPTIONAL MODULES**

### **CELL SIGNALLING IN HEALTH AND DISEASE (LIFE202)**

**Credits: 15 / Semester: semester 2**

This module will describe the molecular mechanisms that allow cells to communicate with each other;

The basic properties common to all signalling pathways will be studied and then a series of individual pathways will be examined in more detail, in the light of these general principles;

The importance of cellular signalling mechanisms will be illustrated by examining diseases (e.g. cancer, diabetes, cardiovascular disease, obesity, neurological disorders) that result from defects in these mechanisms;

The lectures will be supplemented with on-line resources. Students will be given guided reading, and regular formative assessment exercises will enable students to evaluate their understanding of the module;

The module will be assessed by continuous assessment

**ENDOCRINE AND NEURO-PHYSIOLOGY (LIFE204)****Credits: 15 / Semester: semester 2**

This module aims to provide the essential background knowledge to understand key concepts in neuroscience. It covers the principles of operation of nervous system, systematic and sensory neurophysiology, excitotoxicity and behaviour. The module also provides essential background knowledge to understand the key principles of endocrinology, and how it contributes to physiological homeostasis. It covers the secretions, functions and regulation of the major endocrine glands. The module also explores the role of the nervous and endocrine systems in the integrative control of the digestive tract. The lectures will be supplemented with on-line resources. Students will be given guided reading, and regular formative assessment exercises will enable students to evaluate their understanding of the module. The module will be assessed by both continuous assessments and by a final examination.

**THE MULTICELLULAR ORGANISM: TISSUES, DEVELOPMENT, REGENERATION AND AGING (LIFE205)****Credits: 15 / Semester: semester 1**

This module aims to describe the structure and function of fundamental tissues, such as epithelial and connective tissue and of specialised tissues such as bone, muscle and the nervous system. An introduction to the mechanisms by which cells differentiate to form different tissues and regenerate following injury will be included. The processes that occur during aging will be explained with special reference to changes in key tissues and organs. The lectures will be supplemented with on-line resources, guided reading and formative assessment exercises that will enable students to evaluate their understanding of the module. The module will be assessed by both continuous assessment and by a final examination.

**PRINCIPLES OF PHARMACOLOGY (LIFE207)****Credits: 15 / Semester: semester 1**

This module will provide an understanding of the quantitative aspects of drug action on cellular receptors and will address the relationship between drug efficacy and chemical structure.

The module will introduce the basic principles of pharmacokinetics, outline the relationship between drug concentration and response, and include an introduction to the principles of toxicity of drugs and their metabolites.

The module will provide knowledge of the molecular biology of receptors.

The lectures will be supplemented with online resources. Students will be given guided reading, and regular formative assessment exercises will enable students to evaluate their understanding of the module.

The module will be assessed by both continuous assessments and by a final examination.

## **MOLECULAR AND MEDICAL GENETICS (LIFE208)**

**Credits: 15 / Semester: semester 2**

This module aims to introduce students with an interest in Genetics and Molecular Biology to the range of biological mechanisms that control structure and stability of the genetic material and their impact on health and disease.

It uses examples from both prokaryotic and eukaryotic organisms, to develop principles that explain DNA replication, repair and recombination. These principles and processes are then discussed in a clinical/medical genetics context.

The lectures will be supplemented with on-line resources. Students will be given guided reading, and regular formative assessment exercises will enable students to evaluate their understanding of the module.

The module will be assessed by both continuous assessments and by a final examination.

## **COMPARATIVE ANIMAL PHYSIOLOGY (LIFE212)**

**Credits: 15 / Semester: semester 2**

This module describes the physiological problems encountered by animals in their natural environments, and how these problems are overcome.

The setting is environmental, relating lifestyle and physiology to habitat and to the rigours of a potentially hostile environment.

The module will explain how the lifestyles of animals and the independence of animals from environmental disturbance are critically linked to the management of energy flow through their bodies. Physiological mechanisms will be described at all levels of organisation in relation to energetics, temperature, respiration, osmoregulation, and nitrogen excretion. Emphasis will be placed on differentiating the molecular, cellular and system levels of organisation and their integrated role in optimising animal-environmental interactions.

The module is taught through a mixture of asynchronous and synchronous sessions. The former consist of pre-recorded videos, the latter are interactive online sessions to promote student engagement and active learning. Students will also be given guided reading, and regular formative assessment exercises will enable students to evaluate their understanding of the module.

The module will be assessed by Coursework

### **EVOLUTIONARY BIOLOGY (LIFE213)**

**Credits: 15 / Semester: semester 1**

This module seeks to explain how the process of natural selection underpins the origins of biodiversity.

The first part of the module will address the origins of phenotypic diversity, focussing on where heritable phenotypic variation comes from and how it shapes the evolutionary process within species (microevolution).

Having established a basic model for understanding how evolution works, the second part of the module will explain the link between microevolution and evolution above the species level (macroevolution), overviewing the major evolutionary transitions. At the end of the module, students will choose between two specialised short courses on either evolutionary ecology or molecular evolution.

The lectures will be supplemented with online resources. Students will be given guided reading, and regular formative assessment exercises that will enable students to evaluate their understanding of the module.

The module will be assessed by both continuous assessments (40%) and by a final examination (60%).

### **E-BIOLOGY: INFORMATICS FOR LIFE SCIENCES (LIFE225)**

**Credits: 7.5 / Semester: semester 1**

Many aspects of modern biology are being revolutionized by high-throughput methods that make copious amounts of data available in digital form. The aim of this module is to provide students with a practical appreciation of the nature and significance of this revolution. While the focus will be on analysis of data from areas such as genome sequencing, gene expression, and protein structure studies, the module will also look at use of such data in the context of understanding higher order phenomena within cells, such as metabolism, gene regulation, and protein-protein interaction. The module is continuously assessed.

### **TECHNIQUES IN CELL BIOLOGY (LIFE227)**

**Credits: 7.5 / Semester: semester 1**

This practical module aims to provide practical and theoretical experience in techniques currently used in cell biology. These techniques include assay, culture, histology and microscopy. The module is assessed through coursework and a final exam.

## **PRACTICAL HUMAN PHYSIOLOGY (LIFE229)**

**Credits: 7.5 / Semester: semester 1**

The aim of this practical module is to develop students' core experimental skills in human physiology, including methods to measure the cardiovascular and respiratory systems. Students will thus improve their understanding of scientific method, and develop teamworking and presentation skills. During the practical classes and plenary lectures students will be introduced to various techniques for measuring physiological variables. Then they will learn how to apply appropriate statistical tools to define the normal or expected range for physiological variables. Students will learn how to design experiments and how to assess the accuracy and precision of data, and identify sources of error. The module is continuously assessed.

## **EXPERIMENTAL PHYSIOLOGY (LIFE232)**

**Credits: 7.5 / Semester: semester 2**

The aim of this practical module is to provide students with an understanding of physiological regulatory mechanisms, the importance of these systems in maintaining homeostasis and the consequences of system malfunctions. It will use a variety of teaching and learning strategies including lectures, practicals and self-directed study to develop key skills for subsequent educational and employment needs. Students will develop their understanding of scientific method, and where conditions allow their teamworking skills. During the practical classes and plenaries they will be introduced to various techniques for investigating physiological variables. Students will learn how to work individually and, where possible, in small groups to collect, analyse and present data from experiments, simulations and databases. The module is assessed through coursework and an exam which might be conducted online.

## **PRACTICAL PHARMACOLOGY (LIFE234)**

**Credits: 7.5 / Semester: semester 2**

This module aims to provide practical experience in many of the techniques specifically used in the study of Pharmacology. It will also provide you with the specialist skills and knowledge of techniques necessary to undertake practical work and project work in Year Three. Each practical will be introduced through a 15-20 minute presentation and will run for 3 hours. The module will be assessed through a report describing the experimental techniques and main findings of one of the key practicals, and through a final online assessment aimed at evaluating student understanding of the experimental approaches, underpinning pharmacological principles and data processing/interpretation.

## **E-BIOLOGY: INFORMATICS FOR LIFE SCIENCES (S2) (LIFE242)**

**Credits: 7.5 / Semester: semester 2**

Many aspects of modern biology are being revolutionized by high-throughput methods that make copious amounts of data available in digital form. The aim of this module is to provide students with a practical appreciation of the nature and significance of this revolution. While the focus will be on analysis of data from areas such as genome sequencing, gene expression, and protein structure studies, the module will also look at use of such data in the context of understanding higher order phenomena within cells, such as metabolism, gene regulation, and protein-protein interaction. The module is continuously assessed.

*Programme details and modules listed are illustrative only and subject to change.*

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## **YEAR THREE**

(Total required credits are 120)

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.

In year three there is much more flexibility to the course to enable you to follow your

intellectual interests. In semester one you have two compulsory modules, and you will conduct an independent research project in a research lab across the whole year leading to a dissertation. Together, these comprise 60 credits. The remaining 60 credits (one module in semester one and three modules in semester three) must be chosen from the optional modules.

## **COMPULSORY MODULES**

### **ADVANCED HUMAN TOPOGRAPHICAL ANATOMY (LIFE349)**

**Credits: 15 / Semester: semester 1**

This module allows students to deepen and supplement their knowledge of a particular topographical region of the human body through dissection and improve their dissection skills. Students dissect an area of the human body, which they are free to select depending on availability. They have to prepare and submit a document in which they outline what they intend to achieve and how. After feedback, this document will then be extended to produce a reflective report to be submitted at the end of the module. The finished dissection should satisfy the HARC standard for a Prosection, i.e. clean dissection with as much but not more tissue removed than is absolutely necessary to meet the student's own objective(s). The result will be a uniquely 'layered' three-dimensional specimen, which displays all major structures within this region in a topographical context. These Prosections will be assessed and used in their presentation examinations. Students receive substantial supervision but are reminded that with two years of dissecting experience they need to decide themselves which finer structures they want to display and which other parts they may have to sacrifice. Additional 'free' dissection sessions are offered whenever possible.

### **ADVANCED SKILLS AND CONTEMPORARY THEMES IN ANATOMICAL SCIENCE (LIFE347)**

**Credits: 15 / Semester: semester 1**

This module addresses the diversity of scale that comprises modern anatomical research, ranging from genomics, to cell biology, developmental biology, and through tomorphology. It will additionally carry an extensive focus upon scientific literature, and also upon experimental techniques applied in modern anatomical science. The module will begin by building upon foundational topics covered in Year Two, before progressing on to modern experimental approaches and culminating in a progression from genomics to morphology. It will additionally, at the beginning of the year, include a focus on modern career choices for graduate anatomists.

### **RESEARCH PROJECT (LIFE363)**

**Credits: 30 / Semester: whole session**

This module provides students with experience in the planning, design, and execution of a research project in the area of their programme discipline. The project will encompass a range of approaches including laboratory work, fieldwork, outreach work and data, and / or literature analysis depending on the nature of the project. Students will write an evaluative report on a relevant scientific area and work in collaboration with an academic supervisor to develop, plan, carry out, and record research work. The supervisor will hold regular discussion meetings with the student, and both will contribute to a reflective record of progress. Students will be expected to communicate their findings orally and in a variety of written formats.

### **OPTIONAL MODULES**

#### **NEUROMUSCULAR PHYSIOLOGY AND DISEASE (LIFE311)**

**Credits: 15 / Semester: semester 1**

This module will develop an understanding of the concepts fundamental to modern ideas in the physiology of muscles and neurons, related human diseases and model organisms. It will also develop in students the skills to access, collate and discuss the modern literature and to interpret experimental data in neuromuscular physiology. The module will be taught in lectures and tutorials and it will be assessed by both continuous assessment and by a final examination.

#### **HUMAN AND CLINICAL GENETICS (LIFE321)**

**Credits: 15 / Semester: semester 1**

This module aims to develop an advanced understanding of modern medical genetics. It will develop fundamental principles introduced at level 5, including the identification of disease genes, epigenetics, genome instability, cytogenetics and post-genomic approaches. These processes will be explained in the context of clinical genetics, in a manner that illustrates the variety of genetic phenomena that affect human health. The module also aims to develop a critical awareness of the ethical considerations raised by advances in clinical genetics. Content will be delivered through a mixture of lectures and workshops with discussion. In workshops, students will participate by considering the appropriate genetic analyses and techniques that should be utilised in a variety of clinical scenarios, together with the arising ethical concerns. Stream capture of all sessions will be available on VITAL, together with additional resources. The module is assessed by an in course written test (examination) and by a final examination.

### **CURRENT SKILLS AND TOPICS IN EVOLUTIONARY BIOLOGY (LIFE324)**

**Credits: 15 / Semester: semester 2**

This module uses research-led teaching to critically examine a selection of contemporary themes in evolutionary biology.

In the first part, students will receive training in modern methods for reconstructing the evolutionary history of species and specific traits. In the second part, we will cover a range of up to date and exciting topics in evolutionary biology, delivered by staff who are experts in their field;

Here students will learn about and discuss the cutting edge of important and generally applicable areas of evolutionary thought;

The module is taught via lectures, seminars, structured discussions and computer practicals; and assessed by formal examination and continuous assessment.

### **THE CARDIOVASCULAR SYSTEM IN HEALTH AND DISEASE (LIFE330)**

**Credits: 15 / Semester: semester 2**

This module will allow students to build on their existing knowledge of anatomy, cell biology and developmental biology gained in Level 4 and Level 5 modules, and to apply this to understanding the normal function and the dysfunction of the cardiovascular system.

It will also illustrate some 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.

The module will be taught by lectures, seminars and laboratory work and it will be assessed by formal examination and continuous assessment.

### **SPECIALISED BODY SYSTEMS: DEVELOPMENT, DISEASE AND REGENERATION (LIFE332)**

**Credits: 15 / Semester: semester 2**

This module allows students to move beyond regional anatomy to consider the molecular and cellular basis of development, disease and regeneration. The module will focus on the musculoskeletal, digestive and respiratory systems, as well as the kidney. It will have overarching themes of the role of the immune system and stem cells within these systems, together with how tissue imaging and laboratory models are used to study their development and disease. Topics will be presented by experts in their respective fields who will highlight how specific scientific questions are posed and tackled and can impact health and regeneration. Library resources will be accessible through VITAL. Lecturers will provide guidance on the extent of supplementary reading that would be beneficial for each topic. The module is assessed by an in-course assessment task and a final written examination. Previous study will have prepared students with an in-depth knowledge of regional anatomy. This module reaches beyond topographical boundaries to consider several specialised body systems. The subject of immunology is new, therefore the module introduces immunology as a separate topic ahead of considering the role of the immune system in other tissues. For this module library resources will be accessible through the module reading list and other key learning resources will be accessible through VITAL. The lecturers for each topic will highlight the extent to which students are expected to read the material which they will suggest in the reading list, which material should be read ahead of specific sessions and/or whether they should find their own supplementary resources.

### **CLINICAL, ANATOMICAL AND CELLULAR BASIS OF NEUROLOGICAL DYSFUNCTION (LIFE334)**

**Credits: 15 / Semester: semester 2**

This module allows students to complement and extend their existing knowledge of CNS anatomy and biology. This will further their awareness of the mechanisms that allow the brain to perform a myriad of different functions under normal physiological conditions, but also how these mechanisms go wrong in disease.

Students will have the opportunity to develop an understanding of structure-function relationships within the CNS. They will also gain experience of current clinical and translational research in the neurosciences. This should allow the students to discuss latest research results and to extrapolate this knowledge to mental health and neurological disorders.

Students will also acquire an appreciation of the interdisciplinary nature of cutting edge science and how anatomy and neuroimaging in particular, can inform both surgical and pharmacological intervention in neurological disorders.

It is assessed by two periods of assessment with a 40/60% split.

### **THE BODY IN MOTION: MUSCULOSKELETAL FUNCTIONING IN HEALTH, PERFORMANCE AND DISEASE (LIFE335)**

**Credits: 15 / Semester: semester 1**

This module addresses how the musculoskeletal system of humans and other animals functions to perform whole body tasks, such as locomotion and keeping balance.

It will focus on healthy normal functioning but also on sports performance and disease. To do this, the module will first present the basic principles from anatomy, physiology and mechanics that underly musculoskeletal functioning, and then show how these aspects apply to gait and other daily activities, see syllabus.

The module will also address all major relevant techniques.

This module very strongly aligns with the B110 programme, and most notably with the LIFE219, Human Locomotor Anatomy, module but also with LIFE218, Functional Neuroanatomy.

B110 students will see how the anatomy is used in living humans doing daily activities such as walking or running, and how such activities are being studied scientifically and clinically. That said, the module will require no prior detailed anatomical knowledge in order to accommodate for students from other programmes. Rather, the students will contextualise the new materials with their own existing knowledge .

The course will use hybrid teaching delivery with asynchronous content including pre-recorded lectures, videos, texts and interactive use of software. Synchronous sessions will introduce the course contents and provide feedback opportunities.

Summative assessment will consist of essay-style coursework and an online portfolio.

A peer forum will be set up on Canvas to help peer and self-directed learning.

### **INTEGRATIVE COMPARATIVE ANIMAL PHYSIOLOGY (LIFE339)**

**Credits: 15 / Semester: semester 1**

This module will provide students with an insight into physiological mechanisms underpinning adaptations to potentially hostile environmental conditions such as anoxia, toxic sulphide, high hydrostatic pressure and extreme temperatures.

It will also explore the physiological mechanisms related to homeostasis and the evolution of air-breathing, terrestriality and endothermy.

The module will take an integrative approach, considering physiological mechanisms from molecules to cells, tissues, whole animals and the environment.

The module is taught through a mixture of pre-recorded short online lectures and synchronous online seminars and is assessed by coursework.

### **ANIMAL NERVOUS AND MUSCULOSKELETAL DISORDERS (LIFE344)**

**Credits: 15 / Semester: semester 2**

This module will address the cellular, molecular and biochemical basis of a number of disorders in animals.

The latest science underpinning these conditions will be examined through case studies explained by experts in the relevant fields.

Students will be assessed by both in-course and final exam written assignments .

### **BECOMING HUMAN: GENOMICS, DEVELOPMENT, AND EVOLUTIONARY ANTHROPOLOGY (LIFE364)**

**Credits: 15 / Semester: semester 2**

This module takes an interdisciplinary approach to examine human evolution. Beginning with the human genome and how it has evolved, the module moves through the biological scales to examine how the genome has shaped developmental evolution in the human lineage, and finally the adaptations that this developmental evolution produced in the Homo lineage since it split with chimpanzees.

The module will utilise a variety of learning strategies to facilitate student-led and active learning. The teaching sessions will include significant workshop components and problem solving elements. In some cases these will stand independently as traditional lectures/seminars, and in some cases flipped classroom workshop approaches will be used, with material delivered in advance online. In the workshop sessions, students will then engage in activities including debates, small group discussions, and presentations. Supporting materials such as recorded lectures, links to online resources and literature will be provided on VITAL. Students will be guided to key articles (reviews, primary literature) and textbooks which will support learning. Opportunities for individual feedback on learning will be provided.

The module will be assessed through a combination of coursework and a final examination.

**MOLECULAR, CLINICAL AND TRANSLATIONAL CANCER (LIFE373)****Credits: 15 / Semester: semester 1**

The module trains students in molecular oncology, with an emphasis on how scientific advances are translated into clinical practice for patient benefit. This transition from basic biology of cancer to the technologies actually used in cancer diagnosis and treatment, is usually called "translational cancer research" and it is a major focus of the Department of Molecular and Clinical Cancer Medicine, whose scientists will teach the module.

Oncology, whether approached from the clinic, research or the pharmaceutical industry, is a very important career path for Life Sciences graduates. Final year biomedical students will have already seen some aspects of the molecular basis of cancer, through their learning of normal cellular function. This module will strengthen their knowledge of the biochemistry of cancer and will integrate it with the pathology in a cancer patient and the epidemiology and prognosis of cancer.

Students will learn about diagnostic technology, treatment and clinical trials. The module is taught in four topics: 1) introduction to cancer biology; 2) haematological; 3) head and neck and 4) pancreatic cancer.

These themes are delivered as lectures, followed by formative tutorials.

The module assessment comprises two essays.

*Programme details and modules listed are illustrative only and subject to change.*

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**YEAR FOUR**

The fourth year of study offers great flexibility – students may spend it entirely

on campus at Liverpool, but more commonly they take up opportunities to

broaden their experiences, for example a six-week research internship in the UK (in hospitals, industry or research institutes) or abroad (in our partner universities in Thailand or China). Others may elect to spend the entire fourth year on placement, in similar host institutions. Students will take

core modules, in research methods and statistics or informatics, together with a 60-credit research project. Students may replace the internship with other modules that cover advanced topics of global importance.

Core modules

- Research Methods and Applications in Biological Sciences
- Research Project

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## **COMPULSORY MODULES**

### **RESEARCH PROJECT (LIFE700)**

**Credits: 60 / Semester: whole session**

The School offers a range of projects that allow students to conduct research individually at Masters level under the supervision of a member of academic staff. Topics are closely allied to the research field of the supervisor, and the basis of the project may involve data collection by observation and experimentation in situ (field projects), in vitro (laboratory projects), or in silico (bioinformatics). However, all types of projects have the same learning outcomes (that is, all students should acquire the same kinds of skills; see below), achieved by in-depth study. The nature of the lab or field-based projects might be adapted if the field trips or labs access are limited due to unavoidable circumstances.

### **ADVANCED STATISTICS FOR BIOLOGICAL RESEARCH (LIFE707)**

**Credits: 15 / Semester: semester 1**

Successful research in the biological sciences inevitably depends on the power that statistical inference provides for hypothesis testing. Understanding which test to use and when is the key to success. This module aims to further this understanding of, and competence in, the use of statistical techniques in the design of experiments in biological research, and in the analysis and interpretation of data.

The module is available to students who are on-campus (LIFE707) or, alternatively, who are studying on a University of Liverpool programme while off-campus (LIFE607), for example in a yearly placement in industry or while studying at an overseas University.

The learning and teaching materials are delivered as an online set of resources (available through Canvas). The module aims to provide a guide to the statistics that students will need to complete an advanced research project (M-level or PhD), and the ability to develop a research-level statistical approach to the analysis of biological data. The module will also introduce students to the powerful open access statistical software package, R.

### **ADVANCED STATISTICS FOR BIOLOGICAL RESEARCH (OFF-CAMPUS) (LIFE607)**

**Credits: 15 / Semester: semester 1**

Successful research in the biological sciences inevitably depends on the power that statistical inference provides for hypothesis testing. Understanding which test to use and when is the key to success. This module aims to further this understanding of, and competence in, the use of statistical techniques in the design of experiments in biological research, and in the analysis and interpretation of data.

The module is available to students who are on-campus (LIFE707) or, alternatively, who are studying on a University of Liverpool programme while off-campus (LIFE607), for example in a yearly placement in industry or while studying at an overseas University.

The learning and teaching materials are delivered as an online set of resources (available through Canvas). The module aims to provide a guide to the statistics that students will need to complete an advanced research project (M-level or PhD), and the ability to develop a research-level statistical approach to the analysis of biological data. The module will also introduce students to the powerful open access statistical software package, R.

### **RESEARCH METHODS AND APPLICATIONS IN BIOLOGICAL SCIENCES (LIFE731)**

**Credits: 15 / Semester: whole session**

This module will provide students with an understanding of the processes and methods required for the successful planning and delivery of research projects. It will also introduce students to the latest, cutting edge technologies that will support their research field of interest. It will develop in students the transferrable communication skills that will enable them to disseminate their findings to both scientific and general audiences.

### **RESEARCH METHODS AND APPLICATIONS IN BIOLOGICAL SCIENCES (OFF-CAMPUS) (LIFE631)**

**Credits: 15 / Semester: whole session**

This module will provide students with an understanding of the processes and methods required for the successful planning and delivery of research projects. It will also introduce students to the latest, cutting edge technologies that will support their research field of interest. It will develop in students the transferrable communication skills that will enable them to disseminate their findings to both scientific and general audiences.

### **INFORMATICS FOR LIFE SCIENCES (LIFE721)**

**Credits: 15 / Semester: semester 1**

Bioinformatics is a key skill needed in many research settings. This module gives students 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 others. While lectures are provided on core topics, there is a strong emphasis on practical exercises to demonstrate the application of common tools and data sources in these contexts. Teaching is delivered in the form of a weekly lecture and workshops. Students will be given guided reading and online activities to support their learning. The module will be assessed by three data analysis continuous assessments.

### **INFORMATICS FOR LIFE SCIENCES (OFF-CAMPUS) (LIFE621)**

**Credits: 15 / Semester: semester 1**

Bioinformatics is a key skill needed in many research settings. This module gives students 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 others. While lectures are provided on core topics, there is a strong emphasis on practical exercises to demonstrate the application of common tools and data sources in these contexts. Teaching is delivered in the form of a weekly lecture and workshops. Students will be given guided reading and online activities to support their learning. The module will be assessed by three data analysis continuous assessments.

**OPTIONAL MODULES****RESEARCH INTERNSHIP (LIFE701)****Credits: 30 / Semester: semester 1**

The internship is undertaken as placement in the summer period between years 3 and 4 of the MBIoSci programme. The student will work with a research group working on a specific project or a set of related projects. A senior member of the project team will provide day today supervision. The purpose of the internship is for the student to understand the objectives of the research (in of light of the research strategy of the group or institute), how the research is conducted and managed, and how the data are recorded and analysed. The student will also learn how project design is influenced by factors such as, the business strategy of the company, the research priority areas of the country, and ultimately the funding opportunities available to support the research.

**EVOLUTION AND BEHAVIOUR (LIFE709)****Credits: 15 / Semester: semester 1**

This module serves as a focal point for students on the M.Biol.Sci, M.Sc. & M.Res whose interests include evolution, ecology and behavioural biology

The module will make use of varied teaching methods including structured discussions on selected texts as student-led seminars.

The content will focus on areas of evolutionary and behavioural biology that are currently important in the senses (i) that they are progressing rapidly and (ii) that they address fundamental questions of general importance. In addition we will also highlight the key papers and ideas in recent evolutionary biology, showing how research fields develop after pivotal work is published.

The module will have two coursework assessments which are designed to show depth of understanding and an evaluative approach to theory and data in evolutionary biology. There will be some group work, related to one of the assessments.

**CODING FOR LIFE SCIENCES (LIFE733)****Credits: 15 / Semester: semester 1**

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 introduction to the use of Python coding for performing basic tasks in the biological sciences. The student will get practical experience in writing their own Python scripts for basic bioinformatics tasks, such as manipulating DNA, RNA and protein sequences, file input/output and working with other programs, such as BLAST. There is also an introduction to data visualisation using Python, and simple techniques used in data science, including a basic introduction to machine learning.

Around 10 hours of lectures will be provided on core topics, with a strong emphasis on practical activity in workshops and tutorials (totalling around 40 hours), allowing students to gain confidence in writing scripts for their own tasks. The module will be assessed by two short coding assignments, one team working coding assignment building a bioinformatics pipeline, and a data science mini-project.

### **CELLULAR BIOTECHNOLOGY AND BIOLOGICAL IMAGING (LIFE749)**

**Credits: 15 / Semester: semester 1**

Modern biotechnology and bioimaging applies novel tools and approaches to address today's global challenges.

You will learn a variety of methods in mammalian cell biotechnology as well as imaging technologies that range from the microscopic scale to cellular and organ imaging in vivo. You will develop knowledge of a diversity of cell analysis techniques. Furthermore, the use of reporter genes for various types of imaging will be explained, including imaging technologies for cell analysis on the microscopic level as well as for cell imaging and functional analysis in animal models of disease.

The lectures will convey basic knowledge and include examples of applications from actual research publications, or the lecturer's own research work, in equal measure. The students will have learning tutorials on critical appraisal of literature. There will also be a practical workshop on contemporary microscopy.

The module will be taught through a combination of lectures, workshops and practical exercises. There are two written assessments in this module.

### **CONSERVATION MANAGEMENT (ENVS423)**

**Credits: 15 / Semester: semester 2**

Biodiversity, the Earth's support system, is in decline. Conservation of remaining ecosystems and restoration of disturbed ones is essential and urgently needed. Here we cover controversial issues and current debates in conservation with topics covering approaches to protected area management (terrestrial and marine), ecosystem restoration and conservation policy. The module is run as a dynamic, interactive advanced tutorial course. The sessions are mostly run as lectures with background reading and discussion lead by a member of staff, but also include seminars, group work and student-led presentations.

### **ANALYSING CLIMATE PROCESSES AND VARIABILITY (ENVS475)**

**Credits: 15 / Semester: semester 2**

This module will introduce the students to a range of large climate data sets from the whole Earth-atmosphere-ocean climate system these data sets will range from satellite data sets of ocean processes, satellite rain estimation to gridded climate data sets of the ocean and atmosphere, produced from observations, reanalysis and forecasts or projections and the introduction and use of paleorecords of climate change and variation.

## **FRONTIERS IN CANCER RESEARCH AND TREATMENT (LIFE724)**

**Credits: 15 / Semester: semester 2**

The module will address three main topics: hallmarks of cancer, cancer diagnosis and biomarkers, and cancer therapies & current challenges. These topics will be taught using various cancer models that have been selected based on the expertise at the University of Liverpool and to illustrate research, diagnostic and therapeutic problems.

This module will be taught by both scientists and clinicians who are experts in cancer research. The module will be taught through a combination of lectures, seminars, case-based learning tutorials and workshops. The lectures will convey basic knowledge and include examples of applications from actual research publications and the lecturer's own research work.

The students will take part in case-based learning tutorials on critical appraisal of scientific seminars provided by cancer researchers. Workshops will cover literature search, referencing, and preparation of oral scientific presentations in preparation for the final assignment which is a conference style talk. A practical workshop will also cover tumour pathology and will train students in the identification and interpretation of tumour biopsies.

The module will be assessed via two assessments. The first assessment consists of a seminar report, based on a pre-recorded seminar provided by a cancer researcher. The final assessment will be an oral presentation, in which students will be required to give a conference-style lecture on an emerging cancer research topic related to one of the lectures and provide an abstract of their presentation.

## **CANCER CLINICAL TRIALS (LIFE726)**

**Credits: 15 / Semester: semester 2**

Clinical trials are the key final step to translate medical research into the benefit of patients. The Liverpool Clinical Trials Unit is one of the largest in the UK, running a wide variety of surgical and oncology studies, that range from phase I studies to large, practice-changing phase III studies, as well as more novel trial designs. Since new therapies have become available in the treatment of cancer, the methods used in clinical trials have also evolved. The module in Cancer Clinical Trials is aimed at developing the knowledge and understanding of decisions affecting the design, delivery and assessment of clinical trials. This module will be taught by clinicians, researchers, statisticians and trial methodologists at the Liverpool Trials Unit, and cover fundamentals of clinical trials and designs, as well as the challenges that arise at each of these strategies. The module in Cancer Clinical Trials is ideal for current in-service health professionals looking to broaden their role in the design, management, analysis and reporting of clinical trials. It is also suited to those wishing to gain an understanding of clinical trials. The module will be taught through a combination of lectures, case-based learning tutorials and workshops, and assessed via a poster presentation and a written assessment, involving the design of a clinical trial.

## **IMMUNOLOGY (LIFE728)**

**Credits: 15 / Semester: semester 2**

This is a key module for students on the MSc Infection and Immunity Programme and might also be taken by other MSc, MBioSci and MRes students whose interests include infection and immunology. The module is topical in light of the pandemic and will address areas of research-connected immunology teaching across areas of broad relevance to infectious disease, as well as to coronavirus. The module includes research connected lectures, workshops and structured discussions on selected texts as student-led seminars. The content will focus on areas of immunology that support the programme and are relevant in that: (i) they are current/topical or (ii) they address fundamental questions of general importance. In addition, students will also be supported with key research and ideas in immune mechanisms and host defence, showing how research fields progress and our understanding of defence mechanisms develop. The module assessments are aimed at: 1) using graphics to show illustratively specific and complex immunological host-pathogen interactions and will aid skills in image design; and 2) poster presentation to demonstrate immunological interactions based on the student-led workshops on host defence and microbial evasion.

## **DIAGNOSTICS, THERAPEUTICS AND VACCINES (LIFE732)**

**Credits: 15 / Semester: semester 2**

For students with interests in infection biology, the module will enhance skills and enable critically evaluation of key concepts, technologies and multifactorial considerations circumscribing diagnostics, therapeutics and vaccines. The module is topical in light of the current pandemic. The research-connected teaching will focus on prevention, limitation and treatment of infectious disease.

The module comprises lectures, workshops and seminars and uses active-learning delivery methods to ensure students can synthesise and evaluate relative merits, attributes, issues and applications of the topics. There are two coursework assessments in the module: 1) writing a report on a selected emerging pathogen that communicates the multifactorial considerations for researchers and society 2) presentation of a key factor that contributes to or affects disease emergence and the response by society or an agency. Materials will be included on the VLE to develop digital fluency and promote assimilation and appraisal of the module content.

## **COMPUTATIONAL BIOLOGY (LIFE752)**

**Credits: 15 / Semester: semester 2**

With the advent of genomics and functional genomics, biology has become a quantitative data-rich discipline. This has created unprecedented opportunities in virtually every area of life sciences. With the right tools, it is now possible to address fundamentally important biological questions simply analysing already available datasets. This module is designed to prepare students for this very challenge. The module covers the most important aspects of computational biology. These range from the analysis of large datasets to infer biological mechanisms to the use of mathematical modelling to conceptualize and simulate complex biological phenomena. In addition to providing an intuitive overview of the basic theoretical principles, the module will focus on real life applications through multiple cases studies. Among these, students will learn how to identify drug targets and mechanisms of drug resistance and how to understand mathematical models of biological systems. They will then learn aspects of quantitative system pharmacology and physiologically based pharmacokinetic modelling pharmacokinetic/pharmacodynamic modelling.

The module will be taught through a combination of lectures, workshops and seminars. The module will be assessed via a written a report and a literature critique.

## **PROTEOMICS METABOLOMICS AND DATA ANALYSIS (LIFE754)**

**Credits: 15 / Semester: semester 2**

Proteomics and metabolomics represent powerful tools towards unbiased, quantitative and high-throughput analysis of biological systems. Rapid "omic" technological developments in the post-genomic era have provided insights into protein structures, biosynthesis and interactions, as well as the complex metabolic processes that are of significant importance in biological and medical research. The aims of this course are to provide a comprehensive understanding of proteomic and metabolomic techniques and related data analysis, and to illustrate how they can be applied in fundamental biological research and industrial applications. The module will be taught by lectures and workshops. The module will be assessed via two a scientific reports.

## **SYNTHETIC BIOLOGY AND BIOTECHNOLOGY (LIFE756)**

**Credits: 15 / Semester: semester 2**

Synthetic Biology and Biotechnology will provide an in-depth understanding of the grand challenges in biotechnological applications and the principles underlying synthetic biology and modern biotechnological techniques that are designed to sustainably address specific problems. The module also aims to teach tools and strategies being developed and applied in the rapidly expanding field of synthetic biology and train students with practical experience in green biotechnology.

The module will be taught through a combination of lectures and workshops. The lectures will convey basic knowledge or the lecturer's own research work. The workshops will provide students with the opportunity to analyse relevant data relevant to the biotechnology field. The module will be assessed via a scientific report and a scientific review.

## **SUSTAINABLE FOOD SYSTEMS (LIFE747)**

**Credits: 15 / Semester:**

This module covers the ways different food systems function with regards to production, supply and utilisation in the context of the challenge of global food security. It highlights the highly interdisciplinary nature of food systems and how they have evolved and now need to be developed to ensure future sustainable nutritious healthy diets. Successful students will have a thorough appreciation of the linkages between terrestrial and aquatic production systems, supply chains and consumer behaviour in defining food systems and how the linkages influence sustainability. The module is delivered, through e-lectures, small group learning and directed self-learning and assessed by continuous assessment. The module assumes level 6 prior knowledge in one of a biological, psychological, environmental science or business studies discipline. Such knowledge and understanding will be augmented in the context of the interdisciplinary curriculum of the module by guided reading (material made available on the Virtual Learning Environment (VLE), recognising levels of prior knowledge, and through provision within e-lectures). Each curriculum topic is introduced through an e-lecture which develops learning and through in-built formative assessments advises supplemental reading as required. Each topic is followed by a staff-led small group learning session in which the topic is discussed.

The module will be assessed by an essay, presentation and literature review with an emphasis on critical reading, synthesis of concepts and scientific communication.

*Programme details and modules listed are illustrative only and subject to change.*

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## **HOW YOU'LL 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'RE 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 each semester and by final examination.

## **LIVERPOOL HALLMARKS**

We have a distinctive approach to education, the Liverpool Curriculum Framework, which focuses on research-connected teaching, active learning, and authentic assessment to ensure our students graduate as digitally fluent and confident global citizens.

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# Careers and employability

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 professional scientist, higher degrees (M BiolSci, MSc, MRes, MPhil or PhD) at the University of Liverpool or elsewhere provide a flexible set of options for further study.

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 number of routes are available for graduates to enter the teaching profession one of which is taking a postgraduate qualification (PGCE). There are 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.

## **4 IN 5** LIFE SCIENCES STUDENTS FIND THEIR MAIN ACTIVITY AFTER GRADUATION MEANINGFUL.

*Graduate Outcomes, 2018-19.*

Recent employers:

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

### **PREPARING YOU FOR FUTURE SUCCESS**

At Liverpool, our goal is to support you to build your intellectual, social, and cultural capital so that you graduate as a socially-conscious global citizen who is prepared for future success. We achieve this by:

- Embedding employability within your curriculum, through the modules you take and the opportunities to gain real-world experience offered by many of our courses.
- Providing you with opportunities to gain experience and develop connections with people and organisations, including

student and graduate employers as well as our global alumni.

- Providing you with the latest tools and skills to thrive in a competitive world, including access to Handshake, a platform which allows you to create your personalised job shortlist and apply with ease.
  - Supporting you through our peer-to-peer led [Careers Studio](#), where our career coaches provide you with tailored advice and support.
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# Fees and funding

Your tuition fees, funding your studies, and other costs to consider.

## TUITION FEES

Tuition fees cover the cost of your teaching and assessment, operating facilities such as libraries, IT equipment, and access to academic and personal support. [Learn more about tuition fees, funding and student finance.](#)

<b>UK fees</b> Also applies to Channel Islands, Isle of Man and Republic of Ireland	
Full-time place, per year	£9,250
Year in industry fee	£1,850
Year abroad fee	£1,385

<b>International fees</b>	
Full-time place, per year	£25,450

*Fees stated are for the 2023-24 academic year.*

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## ADDITIONAL COSTS

We understand that budgeting for your time at university is important, and we want to make sure you understand any course-related costs that are not covered by your tuition fee. This includes the costs associated with placements or internships, and the optional field course in Uganda.

Find out more about the [additional study costs](#) that may apply to this course.

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## SCHOLARSHIPS AND BURSARIES

We offer a range of scholarships and bursaries to help cover tuition fees and help with living expenses while at university.

[Scholarships and bursaries you can apply for from the United Kingdom](#)

Select your country or region for more scholarships and bursaries.

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# Entry requirements

The qualifications and exam results you'll need to apply for this course.

Your qualification	Requirements <a href="#">About our typical entry requirements</a>
A levels	<p>AAB including A level Biology at grade A.</p> <p>Applicants with the Extended Project Qualification (EPQ) are eligible for a reduction in grade requirements. For this course, the offer is <b>ABB</b> with <b>A</b> in the EPQ.</p> <p>You may automatically qualify for reduced entry requirements through our <a href="#">contextual offers scheme</a>.</p>
GCSE	4/C in English and 4/C in Mathematics
Subject requirements	<p>Biology and a second science, preferably Chemistry, at A level</p> <p>Also accepted as a second science: Environmental Science, Mathematics, Physics, Geography, Psychology, Geology and Applied Science.</p> <p>For applicants from England, where A levels in Biology, Chemistry or Physics have been taken, we will also require a pass in the Practical Endorsement</p>
BTEC Level 3 National Extended Diploma	<p>D*DD in Applied Science with a selection of preferred units in Biology and Chemistry, to include Distinction in Units 1 and 5 (Principles and Applications of Science I and II).</p> <p>For previous BTEC (QCF) qualification:</p> <p>D*DD in Applied Science with a selection of preferred units in Biology and Chemistry, with at least 120 Level 3 credits at Distinction.</p> <p>Please note alternative BTEC subjects are not acceptable for this programme.</p>

Your qualification	<b>Requirements</b> <a href="#">About our typical entry requirements</a>
BTEC Applied Science unit requirements	<a href="#">View the BTEC Applied Science unit requirements.</a>
International Baccalaureate	34 including 6 in Higher Level Biology, and 5 in another higher level subject
Irish Leaving Certificate	H1, H1, H2, H2, H2, H3
Scottish Higher/Advanced Higher	Not accepted without Advanced Highers at grades AAB.
Welsh Baccalaureate Advanced	Accepted at grade B as equivalent to a third non-science A level at grade B.
Access	45 Level 3 credits in graded units in a relevant Diploma, including 30 at Distinction and a further 15 with at least Merit. 15 Distinctions are required in each of Biology and Chemistry. GCSE Mathematics and English grade C/4 also required.
International qualifications	<div style="border: 1px solid gray; padding: 5px; text-align: center;">           Select your country or region to view specific entry requirements.         </div> <p>Many countries have a different education system to that of the UK, meaning your qualifications may not meet our entry requirements. Completing your Foundation Certificate, such as that offered by the <a href="#">University of Liverpool International College</a>, means you're guaranteed a place on your chosen course.</p>

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## ALTERNATIVE ENTRY REQUIREMENTS

- If your qualification isn't listed here, or you're taking a combination of qualifications, [contact us](#) for advice

- [Applications from mature students](#) are welcome.

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**THE ORIGINAL**

**REDBRICK**