BL3000 Field Course

SCOTCAT Credits:	10	SCQF level 9	**Semester**	1
Academic year:	2021-2022			
Planned timetable:	1-week residential course in summer vacation normally just prior to Orientation week.			
This module involves field-based exercises in a range of aquatic and/or terrestrial habitats. Students will examine and measure biodiversity, ecophysiological adaptation, and community structure, with both plant and animal material. Class exercises are used to develop good sampling techniques and to generate and analyse large data sets. Students also work in small project groups to develop individual skills in experimental design, practical manipulations, time-management and personal initiative, and in verbal/written presentation of project results.				
Pre-requisite(s):	Before taking this module you must pass BL2300 and (pass BL2303 or pass BL2304 or pass BL2307 or pass BL2310)			
Anti-requisite(s)	You cannot take this module if you take BL3321 or take BL3322			
Learning and teaching methods of delivery:	**Weekly contact**: 6-day field course, 8h per day.			
	Scheduled learning: 48 hours		**Guided independent study:** 52 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 50%, Coursework = 50%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Resubmission of failed item(s) of coursework			
Module coordinator:	Professor D M Paterson			
Module teaching staff:	Team taught			

BL3301 Protein Structure and Function

SCOTCAT Credits:	20	SCQF level 9	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not capped			
Planned timetable:	9.00 am Mon, Tue & Wed (Lectures); 9.00 am Thu & Fri (Practicals)			
This module covers advanced aspects of protein science. The module introduces the major techniques for protein structure determination that are at the heart of biochemistry, molecular biology and drug discovery. The physical principles behind and strategies for elucidating protein structures by X-ray crystallography, NMR spectroscopy and cryo-electron microscopy are discussed. Membrane proteins are considered as an example of the impact of structural information on understanding biological function. The second part builds an understanding of thermodynamic and kinetic principles of protein interactions. Protein engineering by directed evolution will be introduced. This section is complemented by advanced aspects of enzyme kinetics and enzyme inhibition. The third part of the module considers protein folding and misfolding. It will be examined how proteins achieve functional three-dimensional structures. Protein misfolding diseases are used as examples to highlight the significance of protein folding. Prions and the molecular basis of spongiform encephalopathies are discussed in detail.				
Pre-requisite(s):	Before taking this module you must pass BL2306 and (pass BL2302 or pass BL2309)			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 29 x 1h lectures, 4 x 1h tutorials, 2 x 8h practicals split over several days			
	Scheduled learning: 51 hours		**Guided independent study:** 140 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 3-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Dr U Schwarz-Linek			
Module teaching staff:	Team taught			

BL3302 Gene Regulation

SCOTCAT Credits:	20	SCQF level 9	**Semester**	1
Academic year:	2021-2022			
Planned timetable:	Lectures: 10.00am Mon, Tue and Wed; Practicals: to be arranged.			
This module builds on material covered in BL2302 Molecular Biology. It first considers the structure of genes and the composition of genomes and then examines genetic activity in eukaryotes in relation to nuclear organisation, chromatin structure and epigenetic mechanisms. Regulation of expression at the levels of gene transcription, RNA processing, RNA stability and translation are next covered in detail, drawing particular attention to the nature of protein-nucleic acid interactions. Specific control mechanisms in different prokaryotic and eukaryotic systems, induced by environmental, cell cycle, and metabolic signals are highlighted.				
Pre-requisite(s):	Before taking this module you must pass BL2302 and (pass BL2306 or pass BL2309)			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 19 x 1h lectures, 6 x 1h tutorials, 2 x 8h practicals split over several days			
	Scheduled learning: 78 hours		**Guided independent study:** 122 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 3-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Dr S A MacNeill			
Module teaching staff:	Team taught			

BL3303 Membranes and Cell Communication

SCOTCAT Credits:	20	SCQF level 9	**Semester**	2
Academic year:	2021-2022			
Planned timetable:	Lectures: 9.00 am Mon, Tue and Wed; Practicals: to be arranged.			
This module looks at the various ways in which cells communicate with each other. Cell signalling not only involves the creation and reception of signals but also the mechanisms by which signals are transported across biological membranes. We will therefore consider the central role that biological membranes play in the regulation of the movement of molecules between different extracellular, intracellular and transcellular compartments. Also protein sorting and membrane trafficking will be studied. Using various examples of cell communication, the module will discuss both the molecular and the organismal implications of cell signalling. Topics covered include: (i) Lipids; (ii) Protein targeting and sorting; (iii) Membrane trafficking and transport; (iv) Wnt, Notch and Hedgehog signalling; (v) Plant cell signalling; (vi) Hippo signalling; (vii) Ubiquitylation and SUMOylation.				
Pre-requisite(s):	Before taking this module you must pass BL2301 and (pass BL2305 or pass BL2306 or pass BL2309)			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 27 x 1h lectures, 6 x 1h tutorials, 3 x 7h practicals split over several days			
	Scheduled learning: 54 hours		**Guided independent study:** 146 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 3-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Dr M Bischoff			
Module teaching staff:	Team taught			

BL3307 Evolution

SCOTCAT Credits:	20	SCQF level 9	**Semester**	1
Academic year:	2021-2022			
Planned timetable:	Lectures: 11 am Mon, Tue and Wed; Practicals: to be arranged.			
This module examines how evolutionary processes cause the extraordinary patterns of biological variation we observe on planet Earth, and the approaches that modern research programmes use to study this. Topics include: adaptation, molecular variation and phylogenetics; the evolution of sex; genetics of continuous traits; evolutionary developmental biology; population genetics; speciation, and evolutionary genomics. Practicals will involve computer simulations to investigate a range of evolutionary phenomena, plus use of molecular markers to examine population structure and speciation.				
Pre-requisite(s):	Before taking this module you must pass BL2303			
Learning and teaching methods of delivery:	**Weekly contact**: 3 x 1-hour lectures (x 10 weeks) and 1 x 2-hour and 1 x 3-hour practical during the semester.			
	Scheduled learning: 35 hours		**Guided independent study:** 165 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 3-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Dr N W Bailey			
Module teaching staff:	Team taught			

BL3308 Methods in Aquatic Biology

SCOTCAT Credits:	20	SCQF level 9	**Semester**	1
Academic year:	2021-2022			
Planned timetable:	Lectures: 10.00 am Mon, Tue and Wed; Practicals: 2.00 pm - 5.00 pm Thurs and Fri			
The study of aquatic environments and organisms requires a wide variety of tools. This module introduces many of the tools used to study freshwater and marine environments and the organisms that inhabit these diverse habitats. Research methods covered include conductivity-temperature-pressure sensors, expendable bathythermographs, remote observational platforms (satellites, drones, ocean gliders, etc), passive and active acoustics, animal borne sensors, and methods for population abundance assessment and behavioural observations. This module involves a residential field trip to a field station in the Scottish Highlands.				
Pre-requisite(s):	Before taking this module you must pass BL2300			
Co-requisite(s):	You must also take BL3000			
Learning and teaching methods of delivery:	**Weekly contact**: 3x1-hour lectures (x11 weeks), 4x3-hour practicals, 1x3-day residential field course			
	Scheduled learning: 50 hours		**Guided independent study:** 150 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: Written Exam = 50%, Coursework = 50%			
Re-assessment pattern:	Written Exam = 50%, Coursework = 50%			
Module coordinator:	Dr I M Matthews			
Module teaching staff:	Team taught			

BL3309 Ecosystems and Conservation

SCOTCAT Credits:	20	SCQF level 9	**Semester**	2
Academic year:	2021-2022			
Planned timetable:	Lectures: 10.00 am Mon, Tue and Wed; Practicals: to be arranged.			
This module will examine how ecosystems function and how they provide services for humans: information which is essential for ecologists, conservationists and land managers. The module will consider examples of natural systems being altered by man to demonstrate how ecosystems function and the consequences of anthropogenic change. Disturbance and regulation in ecosystems, atmospheric and hydrological regulation (including the greenhouse effect and acidification), soil ecology, conservation and management of natural resources, agricultural and grazed ecosystems (including GMOs), urban ecosystems and aspects of sustainable development will also be discussed.				
Pre-requisite(s):	Before taking this module you must pass BL2307 and (pass BL2303 or pass BL2304 or pass BL2308)			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 29 x 1h lectures, 3 x 3h practicals, 14 x 1h tutorials			
	Scheduled learning: 39 hours		**Guided independent study:** 161 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 3-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Professor W R L Cresswell			
Module teaching staff:	Team taught			

BL3311 Infection and Disease

SCOTCAT Credits:	20	SCQF level 9	**Semester**	2
Academic year:	2021-2022			
Planned timetable:	Lectures: 10.00 am Mon, Tue and Wed; Practicals: to be arranged.			
This module has lectures in three component areas: parasite infections, viral disease, and pathogenicity of common bacterial infections, and will include consideration of host defences and effective treatment. In all three component areas the emphasis will be on understanding at the molecular level.				
Pre-requisite(s):	Before taking this module you must pass 2 modules from {BL2301, BL2302, BL2309}.			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 30 x 1h lectures, 3 x 8h practicals split over several days			
	Scheduled learning: 63 hours		**Guided independent study:** 137 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 3-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Dr P J Coote			
Module teaching staff:	Team taught			

BL3315 Genes, Cells and Development

SCOTCAT Credits:	20	SCQF level 9	**Semester**	2
Academic year:	2021-2022			
Planned timetable:	Lectures: 11.00 am Mon, Tue and Wed; Practicals: to be arranged.			
This module deals with the fascinating and rapidly changing field of developmental biology from a genetic and cellular perspective. It examines how an organism develops from an egg to an adult, how the cell types and organs are specified, and how lost or damaged body parts can be regenerated or replaced. There will be a focus on some of the typical model species used in cell and developmental biology, including fruit flies, nematodes, mice and frogs, but this will be expanded to include other valuable comparative models, such as chickens, sea squirts, annelids, cnidarians and flatworms. The course will encompass multiple biological levels, from genes, through cells and embryos, to the organism's evolutionary history. As such this module is of wide relevance to a range of other biological disciplines, particularly biomedicine.				
Pre-requisite(s):	Before taking this module you must pass 2 modules from {BL2301, BL2302, BL2304, BL2308}			
Learning and teaching methods of delivery:	**Weekly contact**: 3 x 1-hour lectures (x11 weeks) and 2 x 15-hour practicals, split over several days, during the semester.			
	Scheduled learning: 63 hours		**Guided independent study:** 137 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 3-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Dr D E K Ferrier			
Module teaching staff:	Team taught			

BL3316 Co-evolution: living together

SCOTCAT Credits:	20	SCQF level 9	**Semester**	2
Academic year:	2021-2022			
Planned timetable:	Lectures: 12.00 noon Mon, Tue and Wed; Practicals: to be arranged.			
This module considers coevolution: how organisms influence the evolution of other organisms around them. Some of the most exquisite and remarkable adaptations in the natural world are the products of coevolution, from the elaborate displays of birds-of-paradise to the sexual mimicry of orchids. We will consider coevolution within a species, focusing in particular on the interactions between males and females, and also coevolution between species, including animal-plant interactions, host-parasite interactions, and predator-prey interactions. Topics to be considered in detail will be sexual selection, pollination biology, herbivory, prey defences, the evolution of virulence, and the ecology of coevolution, focusing in particular on tritrophic interactions between animals, plants and fungi. Finally, we will consider broader themes in coevolution, including the geographic mosaic theory of coevolution and applied aspects of coevolution.				
Pre-requisite(s):	Before taking this module you must pass BL2304 or pass BL2307 or pass BL2310			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 33 x 1h lectures, 2 x 3h practicals, 3 x 2h Q&A session, and 1 x 3h seminar			
	Scheduled learning: 39 hours		**Guided independent study:** 161 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 3-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Dr D M Shuker			
Module teaching staff:	Team taught			

BL3318 Biology of Marine Organisms

SCOTCAT Credits:	20	SCQF level 9	**Semester**	2
Academic year:	2021-2022			
Planned timetable:	12 noon Mon, Tue & Wed (Lectures); To be arranged (Practicals)			
This module will include lectures on the range of microbial and metazoan organisms and ecological systems in the marine environment. The coverage will range from bacteria, to algae, invertebrates and vertebrates (fish, birds, reptiles and mammals). The biology of marine organisms is considered in the context of both adaptations at the level of the individual and its expression in terms of large-scale latitudinal and depth-related variations in productivity and food web structure. Examples from the poles to the tropics and from shallow water to the deep ocean will be included.				
Pre-requisite(s):	Before taking this module you must pass 1 module from {BL2304, BL2308, BL2310}. Before taking this module you must pass at least 1 module from {BL2307, BL2311}			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 26 x 1h lectures, 6 x 1h discussion sessions, 2 x 3h practicals			
	Scheduled learning: 40 hours		**Guided independent study:** 160 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 3-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Dr J N Oswald			
Module teaching staff:	Team taught			

BL3319 Animal Behaviour: A Quantitative Approach

SCOTCAT Credits:	20	SCQF level 9	**Semester**	2
Academic year:	2021-2022			
Planned timetable:	Lectures: 9.00 am am Mon, Tue and Wed; Practicals: to be arranged.			
This module is designed to provide a broad and multifaceted perspective on animal behaviour, emphasising contemporary theoretical, mathematical and statistical approaches to the discipline. Nobel-Prize-winning ethologist, Niko Tinbergen, pointed out that to understand behaviour fully researchers had to answer four types of questions, about its causation, function, development and evolution. All four areas are covered in the course, which includes lectures on the genetic, neural, physiological and experiential (i.e. learning) influences on behaviour; behavioural development; foraging; sexual behaviour, sexual selection and mate choice; communication, cooperation and culture. The course contains extensive material of a formal theoretical nature, and emphasises quantitative skills throughout. Students will be introduced to new mathematical and statistical approaches within the field.				
Pre-requisite(s):	Before taking this module you must pass BL2303 or pass BL2307 or pass BL2310			
Learning and teaching methods of delivery:	**Weekly contact**: 3 x 1-hour lectures (x 11 weeks), 3 x 1- hour mini-project group meetings during the semester.			
	Scheduled learning: 36 hours		**Guided independent study:** 164 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 3-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module teaching staff:	Team taught			

BL3320 Statistical and Quantitative Skills for Biologists

SCOTCAT Credits:	10	SCQF level 9	**Semester**	1
Academic year:	2021-2022			
Planned timetable:	To be arranged.			
Few biologists are statisticians or mathematicians, but all biologists use statistics and mathematics. This series of workshops is designed to build confidence in organising and analysing data to address biological questions efficiently. The module will help you learn how to identify statistical and quantitative approaches, and how to manage and analyse data in a code driven statistical programming package. An introductory workshop will cover basic concepts and practical training that will be used in a choice of specific workshops that cover applications across the range of Biology.				
Pre-requisite(s):	Before taking this module you must pass BL2300. The pre-requisite of BL2300 is waived for BSc Neuroscience students.			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 12 x 1h lectures, 13h practical work spread throughout the semester, 7 x 1h tutorials			
	Scheduled learning: 29 hours		**Guided independent study:** 71 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	2-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Professor W R L Cresswell			
Module teaching staff:	Team taught			

BL3322 Basic Biochemistry Laboratory

SCOTCAT Credits:	10	SCQF level 9	**Semester**	1
Academic year:	2021-2022			
Planned timetable:	1 week in summer vacation just prior to Orientation week			
This module aims to provide students with the basic skills for independent laboratory work and an opportunity to develop academic skills such as: the design of experiments; logistic planning; the gathering and assessment of data; and the presentation of results. In addition, transferable skills such as group work, working to deadlines, numeracy, critical reading of peer-reviewed literature, and presenting material (oral and written) will be developed. Importantly, the course will also be an opportunity to meet and work with others in the honours cohort. The practical element will emphasise techniques in protein biochemistry.				
Pre-requisite(s):	Before taking this module you must pass BL2301 or pass BL2302 or pass BL2306			
Anti-requisite(s)	You cannot take this module if you take BL3000 or take PN3321			
Learning and teaching methods of delivery:	**Weekly contact**: 5-day laboratory course, 8h per day.			
	Scheduled learning: 40 hours		**Guided independent study:** 60 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Coursework = 100%			
Module coordinator:	Dr R Guimaraes da Silva			
Module teaching staff:	Team taught			

BL3323 Terrestrial Zoology

SCOTCAT Credits:	20	SCQF level 9	**Semester**	1
Academic year:	2021-2022			
Planned timetable:	9.00 am Mon, Tue, Wed. Practicals: to be arranged.			
This module covers the biology of land animals, including their early evolution, their strategies to cope with unusual terrestrial habitats (extremes of hot, arid and cold, urban life, island life, etc, including climate change effects), and their special problems with reproduction and locomotion. It then looks at insights gained from modern techniques, including molecular, bioinformatics and bar-coding approaches, bio-logging and tracking, and developmental adaptations. It concludes with special topics on particular animals or groups that have improved our understanding of terrestrial peculiarities, whether behavioural, sensory, physiological, mechanical, metabolic or ecological; and of threats to terrestrial diversity for certain groups.				
Pre-requisite(s):	Before taking this module you must pass BL2310 and (pass BL2304 or pass BL2308)			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 30 x 1h lectures, 2 x 3h practicals, 4 x 1h tutorials			
	Scheduled learning: 37 hours		**Guided independent study:** 163 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 3-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	3-hour Written Examination = 50%, Existing Coursework = 50%, module grade capped at 7.			
Module teaching staff:	Team taught			

BL3324 Advanced Biochemistry

SCOTCAT Credits:	20	SCQF level 9	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not capped			
Planned timetable:	12.00 noon Mon, Tue, Wed (lectures) 9.00 am Thu, Fri (practical classes)			
Recent transformative changes in Biochemistry have enabled the exploration of biomolecular structures and their interactions, in vitro and in vivo. This module will provide an overview of the growing and powerful toolkit available for this new era in Biochemistry. An appreciation of these techniques, and their applications, is essential to address: 1. fundamental questions in biology 2. the 'grand challenges' including: sustainable agriculture & food, renewable resources and clean growth and an integrated understanding of health Advanced Biochemistry will provide a broad overview of current and emerging approaches used to characterise proteins and their interactions with other metabolites, proteins, biomolecules and drugs.				
Pre-requisite(s):	Before taking this module you must take BL3301 and (pass BL2302 or pass BL2306)			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 24 x 1h lectures, 5 x 1h workshops, 2 x 3h practical, 1 x 4h practical			
	Scheduled learning: 51 hours		**Guided independent study:** 140 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 3-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Dr J Nairn			
Module teaching staff:	Team taught			

BL4200 Literature-based Research Project

SCOTCAT Credits:	30	SCQF level 10	**Semester**	Full Year
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
This project will involve an extensive literature review to investigate a defined hypothesis or problem within the field of biology, appropriate to the degree programme being studied by each student. The project will involve diligence, initiative and independence in pursuing the literature, and the production of a high-quality dissertation that demonstrates a deep understanding of the chosen area of research. Students will be allocated to a member of staff who will guide and advise them in research activities throughout the academic year. The project will be written up in the form of a research dissertation.				
Pre-requisite(s):	Permission of Biology Honours Adviser required			
Anti-requisite(s)	You cannot take this module if you take BL4201 or take PN4299			
Learning and teaching methods of delivery:	**Weekly contact**: 1 dedicated meeting with supervisor per week, students should expect to spend the equivalent of 8 weeks full-time on this research project.			
	Scheduled learning: 22 hours		**Guided independent study:** 278 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 20%, Coursework = 80%			
	As used by St Andrews: Coursework = 100% (10% - Thesis outline and resource list 1,000 words 70% - Written thesis 15,000 words 20% - Viva (20 minutes))			
Re-assessment pattern:	Resubmission of failed item(s) of Coursework			
Module coordinator:	Professor S D Healy			
Module teaching staff:	Individual Supervisors across the School of Biology			

BL4201 Experimental Research Project

SCOTCAT Credits:	60	SCQF level 10	**Semester**	Full Year
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
This project will involve extensive research to investigate a defined problem within biology, appropriate to the degree programme being studied by each student. The project will involve diligence, initiative and independence in pursuing the literature, good experimental design, good experimental and/or analytical technique and excellent record keeping. The project will culminate in the production of a high-quality report that demonstrates a deep understanding of the chosen area of research. Students will be allocated to a member of staff within the School of Biology, who will guide and advise them in research activities throughout the academic year.				
Pre-requisite(s):	Permission of Biology Honours Adviser required			
Anti-requisite(s)	You cannot take this module if you take BL4200 or take PN4299			
Learning and teaching methods of delivery:	**Weekly contact**: Weekly contact: 1 dedicated meeting with supervisor per week. Students should expect to spend the equivalent of 1 semester full-time conducting supervised research and completing the associated assessments. This time is either condensed into 1 semester or spread out over the whole year.			
	Scheduled learning: 33 hours		**Guided independent study:** 567 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 20%, Coursework = 80%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Resubmission of failed item(s) of Coursework			
Module coordinator:	Professor S D Healy			
Module teaching staff:	Individual Supervisors across the School of Biology			

BL4210 Practical Skills for Molecular Biology and Biochemistry

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
Practical skills are the core of research in biochemistry and molecular biology. This module is designed to prepare students for laboratory research projects in internationally competitive research. The module is designed to foster skills such as experimental design, core practical skills, data analysis and excellent record keeping. Each practical requires some prior theoretical familiarity. Emphasis is placed upon experimental design - notably anticipation of experimental outcomes and the choice of appropriate experimental controls. This planning phase is followed by execution of the experiment and analyses of the data.				
Pre-requisite(s):	Permission of Biology Honours Adviser required			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 5 x 1h lectures, 2 x 10h practicals split over several days, 10 x 1h tutorials			
	Scheduled learning: 35 hours		**Guided independent study:** 115 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 30%, Practical Examinations = 0%, Coursework = 70%			
	As used by St Andrews: 1-hour Written Examination = 30%, Coursework = 70%			
Re-assessment pattern:	1-hour Written Examination = 30%, Existing Coursework = 70%			
Module coordinator:	Dr M M Nevels			

Module teaching staff:	Dr M Nevels, Prof M White

BL4211 Antimicrobials - Mode of Action and Resistance

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
This module will commence by establishing the fundamental basis of antimicrobial efficacy in terms of selective toxicity, with a brief history of antimicrobials and factors that make the ideal antimicrobial. This will be followed by study of the known inhibitory action of antibacterial and antifungal drugs at the molecular level, and study of the molecular basis of microbial resistance to these drugs. Lastly, potential new sources of antimicrobials will be considered, particularly antimicrobial peptides and 'natural' antimicrobials.				
Pre-requisite(s):	Before taking this module you must pass BL3311			
Learning and teaching methods of delivery:	**Weekly contact**: 2 x 1-hour seminars (x 9 weeks).			
	Scheduled learning: 18 hours		**Guided independent study:** 132 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 20%, Coursework = 30%			
	As used by St Andrews: 1-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	1-hour Written Examination = 50%, Existing Coursework = 50%			
Module coordinator:	Dr P J Coote			
Module teaching staff:	Dr P Coote			

BL4212 How Enzymes Work

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
All cells depend on enzymes to catalyse the reactions that produce the energy required for life. Understanding enzymes and their regulation underpins research on, for example, drug development. This module will study how the structures and molecular functions of selected examples enable these biological roles and how to harness this understanding to develop enzymatic tools for the biotechnology industry. Topics will include natural RNA enzymes and in vitro engineered ribozymes for applications in biotechnology, elucidating the mode of action of enzyme inhibitors to provide insights into their therapeutic effects, and diaspartic and metal proteases in addition to other enzymes depending on the research interests of the academic staff. It will develop deductive skills, literature research, and communication of specific knowledge from reviews and primary research articles and will encourage integration of previous knowledge of protein structure and function, gene expression and metabolic regulation into the exploration of the cellular roles of enzymes				
Pre-requisite(s):	Before taking this module you must pass BL3301			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminars (x 10 weeks).			
	Scheduled learning: 20 hours		**Guided independent study:** 130 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Existing Coursework = 100%			
Module coordinator:	Dr J C Penedo-Esteiro			
Module teaching staff:	Team taught			

BL4213 Molecular Virology

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
Viruses cause clinically and economically important human and animal diseases, examples include influenza viruses, HIV and foot and mouth disease virus, as well as emerging viruses such as ebola virus and coronaviruses. The module will consist of a mixture of lectures, group and student-led learning activities. You will (i) gain knowledge in 4 key topics in molecular virology, (ii) acquire understanding of commonly used molecular techniques used to study viruses (obtained via reading, interpretation and discussion of recent research papers in virology rather than practical class content) and (iii) explore virus-related topics that have made headline news.				
Pre-requisite(s):	Before taking this module you must pass BL3311			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 14 x 1h lectures, 4 x 1h tutorials, 2 x 2h Q&A sessions			
	Scheduled learning: 14 hours		**Guided independent study:** 136 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 40%, Practical Examinations = 0%, Coursework = 60%			
	As used by St Andrews: 90 min Written Examination = 40%, Coursework = 60%			
Re-assessment pattern:	90 min Written Examination = 40%, Existing Coursework = 60%			
Module coordinator:	Dr S A Young			
Module teaching staff:	Team taught			

BL4215 Bacterial Virulence Factors

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
In order to establish an infection in a host, pathogenic bacteria rely on mechanisms to adhere to host tissue, gain entry into cells, escape the host's immune response and spread and survive within or on the host. These processes are mediated by bacterial virulence factors, i.e. proteins and other bacterial products that utilise and subvert diverse host cellular processes for the benefit of the pathogen. In this module students will explore how structural biology has led to significant breakthroughs in understanding the molecular bases of some important bacterial infections.				
Pre-requisite(s):	Before taking this module you must pass BL3301			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semseter: 8 x 1h lectures (2 lectures a week for 4 weeks), 3 x 1h tutorials, 3 x 3h seminars			
	Scheduled learning: 19 hours		**Guided independent study:** 131 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Existing Coursework = 100%			
Module coordinator:	Dr U Schwarz-Linek			

BL4216 Structure-based Drug Discovery

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
The process of developing a new drug from conception to the clinic takes on average 15 years and costs over $800M. There are now many examples of drugs developed based on a knowledge of the three dimensional structure of the target, and all major pharmaceutical companies have structural biology as part of their core drug discovery programmes. Many drugs currently used to combat AIDS were developed from a detailed knowledge of key HIV proteins, as were the two drugs used for influenza. Most major pharmaceutical companies are targeting kinases in the search for new cancer therapies, with international efforts focusing on producing structural details of huge numbers of human kinases.This module will examine case studies of drugs that have been developed with the aid of structure-based methods.				
Pre-requisite(s):	Before taking this module you must pass BL2306 or pass BL3301 or pass BL3324			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar (x 4 weeks) and 1 x 2-hour student presentations in teams representing imaginary drug companies (x 3 weeks).			
	Scheduled learning: 14 hours		**Guided independent study:** 136 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 40%, Practical Examinations = 40%, Coursework = 20%			
	As used by St Andrews: Written Exam = 40%, Practical Exam = 40%, Coursework = 20%			
Re-assessment pattern:	1.5-hour Written Examination = 40%, Existing Coursework = 60%			
Module coordinator:	Dr T M Gloster			
Module teaching staff:	Dr T Gloster, Prof G Taylor, Dr J Nairn			

BL4222 Metabolic and Clinical Biochemistry

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
This module extends the students' knowledge of human metabolism and applies it to pathologies. The syllabus includes: a study of the integration of whole body metabolic processes, discussion of the role of biochemistry in investigating and monitoring human disease, the methods of diagnosing and treating some common diseases. Topics will cover integration of whole body metabolism, starvation processes, diabetes, metabolic variability, inborn errors of metabolism, endocrinology, homeostasis, plasma protein metabolism, muscle and hepatic metabolism, drug disposition and metabolism, and defects in glucose and lipid metabolism.				
Pre-requisite(s):	Permission of Biology Honours Adviser required			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar (x 9 weeks), 2 x 3-hour students presentations for 1 week			
	Scheduled learning: 24 hours		**Guided independent study:** 126 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 30%, Practical Examinations = 35%, Coursework = 35%			
	As used by St Andrews: 1.5-hour Written Examination = 30%, Coursework = 70%			
Re-assessment pattern:	1.5-hour Written Examination = 30%, Existing Coursework = 70%			
Module coordinator:	Dr F M der Weduwen			
Module teaching staff:	To be arranged and invited NHS staff			

BL4224 Molecular Mechanisms of Membrane Trafficking

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
Membrane trafficking mediates the transport of substances between different cellular organelles and the secretion of substances from cells. As such, regulation of membrane trafficking is applicable to all cell types, but especially to specialised secretory cells such as neurons, which secrete neurotransmitters and pancreatic beta-cells which secrete insulin. This module will consider how molecules control the movement of substances through the secretory pathway, but will focus on how cells regulate the release of contents. Within the module you will look at the proteins involved, the different experiments used to study the process and how model organisms are enhancing our understanding.				
Pre-requisite(s):	Before taking this module you must pass BL3303			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar (x 11 weeks)			
	Scheduled learning: 22 hours		**Guided independent study:** 128 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 25%, Practical Examinations = 20%, Coursework = 55%			
	As used by St Andrews: 2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	2-hour Written Examination = 50%, Existing Coursework = 50%			
Module coordinator:	Dr J Tilsner			
Module teaching staff:	To be arranged and Dr J Tilsner			

BL4225 Advanced Microscopy and Image Analysis - Seeing is Believing

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged			
This module will introduce you to advanced imaging techniques, such as Confocal, Super-resolution, TIRF and Electron Microscopy and how these techniques have been utilised to address fundamental questions in Cell and Developmental Biology. You will get the opportunity to research techniques that are at the forefront of modern Biology and to develop skills in ImageJ analysis of imaging data, a skill that will be central to the advancement of bioscience in the coming years. Activities will be supplemented with research talks from academics at the cutting edge of their field.				
Pre-requisite(s):	Before taking this module you must pass BL3303 or pass BL3315			
Anti-requisite(s)	You cannot take this module if you take BL5420			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar (x 11 weeks)			
	Scheduled learning: 22 hours		**Guided independent study:** 133 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 20%, Practical Examinations = 30%, Coursework = 50%			
	As used by St Andrews: 1.5-hour Written Examination = 20%, Coursework = 80%			
Re-assessment pattern:	1.5-hour Written Examination = 20%, Existing Coursework = 80%			
Module coordinator:	Dr M Bischoff			

BL4226 Chromatin and Genome Stability

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged			
This module will introduce the fundamental concepts of chromatin structure and function and how this affects genome stability. DNA repair and telomere maintenance are perhaps the most significant factors affecting genome stability and these processes are central to the understanding of cancer cell biology. Indeed, most existing anti-cancer agents induce DNA damage and current efforts to target chromatin factors therapeutically are showing promise. You will have the opportunity to independently research and present seminars on the applied biology of chromatin and DNA repair within model organisms such as budding yeast, Caenorhabditis elegans and Drosophila melanogaster. Students will also have the opportunity to engage in research debates on topics at the forefront of modern cancer biology. Importantly, you will be expected to design and defend a research proposal that addresses an unsolved question of your choice within the field of genome stability.				
Pre-requisite(s):	Before taking this module you must pass BL3302			
Anti-requisite(s)	You cannot take this module if you take BL5421			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar (x 11 weeks)			
	Scheduled learning: 22 hours		**Guided independent study:** 146 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 25%, Practical Examinations = 0%, Coursework = 75%			
	As used by St Andrews: 1.5-hour Written Examination = 25%, Coursework = 75%			
Re-assessment pattern:	1.5-hour Written Examination = 25%, Existing Coursework = 75%			
Module coordinator:	Dr H C Ferreira			
Module teaching staff:	Dr H Ferreira			

BL4249 Scientific Diving

SCOTCAT Credits:	15	SCQF level 10	**Semester**	Both
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	Full Time 2-3 weeks in January/February			
This module will provide both theoretical and practical experience of the techniques used by scientific divers. The module is restricted to students who have an existing diving qualification (PADI Advanced Open Water Diver or BSAC Sports Diver or equivalent). Seminars during the field trip will cover diving safety, dive project planning, management, risk assessment and the theory behind underwater surveying techniques. Abroad, students will receive training in underwater marine identification, construction and deployment of underwater surveys and sampling techniques, gaining practical experience of recording, analysing and interpreting survey data. Then they conduct a mini-research project using suitable survey techniques and present their findings through a report and a presentation. There are additional costs attached to this module which the student will be expected to meet.				
Pre-requisite(s):	Permission of Biology Honours Adviser required, PADI Advanced Open Water Diver or BSAC Sports Diver (or equivalent). Before taking this module you must pass BL4251			
Learning and teaching methods of delivery:	**Weekly contact**: 8 hours per day for 2 weeks.			
	Scheduled learning: 96 hours		**Guided independent study:** 54 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 45%, Coursework = 55%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Resubmission of failed item(s) of Coursework			
Module coordinator:	Dr M M Borges Da Costa Guint Barbosa			
Module teaching staff:	Team taught			

BL4251 Tropical Marine Biology

SCOTCAT Credits:	15	SCQF level 10	**Semester**	Both
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			

The goal of this module is to examine the ecological and biological principles underpinning the major tropical marine ecosystems. The module provides an understanding of the ecological processes that control tropical marine ecosystems, and considers the organisms that are characteristic of each. All the major tropical marine habitats will be considered, but with a focus on coral reef, seagrass and mangrove ecosystems. The module also tackles topical research areas on the subject through student-led seminars, which will vary depending on the latest scientific research and the specific interests of participants. On completion of the module, students will have an understanding of coral reef, mangrove and seagrass ecology. They will understand the biology and physiology of corals and be able to identify the major phyla associated with tropical marine ecosystems. The module will also provide an understanding of the threats to tropical marine habitats, current research trends on tropical marine systems, and the scientific approaches and techniques used tackle scientific questions relating to tropical marine biology.

Learning and teaching methods of delivery:	**Weekly contact**: Lectures and seminars.	
	Scheduled learning: 21 hours	**Guided independent study:** 129 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%	
	As used by St Andrews: Coursework = 100%	
Re-assessment pattern:	Resubmission of failed item(s) of Coursework	
Module coordinator:	Dr M M Borges Da Costa Guint Barbosa	

BL4254 Fisheries Research

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			

This module will provide an introduction to the utilisation of fish stocks in a sustainable way. It will focus on how the status of these stocks can be assessed, the problems associated with determining catch limits, and how advice from fisheries scientists is communicated to managers. There will be a mixture of dedicated lectures (including talks from outside experts), student-led seminars, tutorials and practical computer sessions.

Pre-requisite(s):	Before taking this module you must pass BL3309	
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar (x 11 weeks)	
	Scheduled learning: 22 hours	**Guided independent study:** 128 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 30%, Practical Examinations = 45%, Coursework = 25%	
	As used by St Andrews: 1.5-hour Written Examination = 30%, Coursework = 70%	
Re-assessment pattern:	1.5-hour Written Examination = 30%, Existing Coursework = 70%	
Module coordinator:	Dr C G M Paxton	
Module teaching staff:	Dr C Paxton	

BL4258 Foraging in Marine Mammals

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
This module will provide primarily seminar and practical-based analysis of the life-history requirements of foraging in marine mammals, geographical and physiological constraints on finding food, food and feeding with a focus on types of prey and adaptations by the prey, adaptations for marine mammals feeding in the marine environment, optimal foraging theory, and optimal diving theory. Initial lectures will focus on theoretical issues and description of methods to study foraging. Students will then conduct case-studies of marine-mammal foraging, which will be presented in a seminar format as a group.				
Pre-requisite(s):	Before taking this module you must pass BL3319			
Learning and teaching methods of delivery:	**Weekly contact**: Introductory lecture plus 3 x 1-hour lectures (x 3 weeks), 2 x 2-hour student-led seminars (x 4 weeks)			
	Scheduled learning: 26 hours		**Guided independent study:** 124 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 40%, Practical Examinations = 20%, Coursework = 40%			
	As used by St Andrews: 2-hour Written Examination = 40%, Coursework = 60%			
Re-assessment pattern:	2-hour Written Examination = 40%, Existing Coursework = 60%			
Module coordinator:	Dr S C Smout			
Module teaching staff:	Dr S Smout, Dr D Thompson			

BL4259 Marine Mammals and Man

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
Marine mammals interact with human activities in a variety of ways and are frequently the focus of more general concerns about the health and exploitation of marine ecosystems. This module explores the impact of these activities on individuals and populations of seals and cetaceans, and vice versa. Most marine mammals species are long-lived and slow reproducing and the impacts of unmanaged human activities can be severe; a number of species or populations are threatened as a result. The module explores how best to provide robust scientific advice to inform conservation and management at local, national and international level.				
Pre-requisite(s):	Before taking this module you must pass BL3318			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 10 x 2h seminars (2 or 3 a week for 3 weeks), 2 x 3h assessed presentations			
	Scheduled learning: 36 hours		**Guided independent study:** 114 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 50%, Coursework = 50%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Resubmission of failed item(s) of Coursework			
Module coordinator:	Professor P S Hammond			
Module teaching staff:	Prof P S Hammond, Dr S Northridge, Dr A Hall, Dr Gordon			

BL4262 Environmental Drivers of Marine Habitats

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
This module aims to give a broad overview of the different environmental drivers of marine ecosystems. Shorter term processes in the ocean and atmosphere as well climate define marine habitats and a series of lectures will be provided to assure that students have the broad background required to tackle primary literature in this field and can apply their knowledge within different fields of marine science. Students will present on particular focus areas within each lecture topic, based upon reading primary literature.				
Pre-requisite(s):	Permission of Biology Honours Adviser required			
Learning and teaching methods of delivery:	**Weekly contact**: 2 x 2-hour seminar or lecture (x 5 weeks)			
	Scheduled learning: 20 hours		**Guided independent study:** 130 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 60%, Practical Examinations = 40%, Coursework = 0%			
	As used by St Andrews: 2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module coordinator:	Dr L Boehme			

BL4263 The Question of Culture in Animals

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
The existence and extent of social learning and cultural transmission in non-humans is a very active area of current research, as well as of controversy, with vigorous ongoing debate. The aim of this module is to provide an introduction to this area through considering the conceptual issues and direct and indirect evidence for cultural transmission in a range of non-human animals, including insects, fish, birds, primates and cetaceans. We will consider what is meant by the term ?culture?, how is used and studied in the human context, how it can be studied in non-humans, and the evidence for and against such processes being present in a range of non-human societies.				
Pre-requisite(s):	Before taking this module you must pass BL3319			
Learning and teaching methods of delivery:	**Weekly contact**: 10 x 2 hour class meetings, supported by extensive independent study			
	Scheduled learning: 20 hours		**Guided independent study:** 130 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 40%, Practical Examinations = 10%, Coursework = 50%			
	As used by St Andrews: 100% Coursework			
Re-assessment pattern:	100% Coursework			
Module coordinator:	Dr L E Rendell			
Module teaching staff:	Dr Luke Rendell, Dr Michael Webster, Prof Christian Rutz, Dr Ellen Garland, Dr Catherine Hobaiter			

BL4266 Conservation Research Methods

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
The conservation of animal and plant populations relies initially on information of population sizes and trends. This information can only be collected by fieldwork. This module teaches the basic field techniques that underpin the monitoring of populations. Each week the theory behind a different technique is introduced, then the technique is practiced in the field, and finally data collected by the technique are analysed and discussed in a workshop at the end of the week, so that a full understanding of a technique and its proper application is gained. The module ends with students carrying out a project applying and integrating the techniques they have learnt.				
Pre-requisite(s):	Before taking this module you must pass BL3309			
Learning and teaching methods of delivery:	**Weekly contact**: Variable combination of lectures, field practicals, data collection in the field and analysis workshops per week for 10 weeks			
	Scheduled learning: 40 hours		**Guided independent study:** 110 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 25%, Coursework = 75%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Resubmission of failed item(s) of Coursework			
Module coordinator:	Professor W R L Cresswell			
Module teaching staff:	Prof W Cresswell			

BL4268 Science Communication of Biodiversity and Conservation

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
This module will focus on the scientific problems associated with the conservation and sustainable use of animals and plants, and on the way in which scientific advice on these issues is provided. Initial lectures will cover sustainable development and the precautionary principle; the causes of extinction; the economics of conservation; management of exploitation; and estimating species richness. After this student-led seminars will cover a range of more specialist issues of current concern. Practical work on population viability analysis, classifying populations using the IUCN criteria, and species richness estimation may be included.				
Pre-requisite(s):	Before taking this module you must pass BL3309			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar (x 11 weeks) plus 6 additional 2-hour lectures during the sememster			
	Scheduled learning: 34 hours		**Guided independent study:** 116 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 40%, Coursework = 60%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Resubmission of failed item(s) of Coursework			
Module coordinator:	Professor M A Azeredo de Dornelas			
Module teaching staff:	Dr M Dornelas			

BL4270 Plant-environment Interactions

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
This module will provide an analysis of the ways in which plants interact with their physical, chemical and biological environments. This is a wide-ranging course which will bring together current knowledge of the physiological and molecular responses of plants within the wider context of how whole organisms and communities respond to the environment. Topics include: parasitism, plant pathogens and diseases, symbioses, plant stress responses, and human influences such as pollution, bioremediation and genetic modification.				
Pre-requisite(s):	Permission of Biology Honours Adviser required			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar (x 11 weeks), plus 1 x additional seminar			
	Scheduled learning: 24 hours		**Guided independent study:** 126 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 34%, Coursework = 66%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Resubmission of failed item(s) of Coursework			
Module coordinator:	Professor J Jones			
Module teaching staff:	Prof J Jones			

BL4273 Computational Genomics

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Limited to 12 students due to nature of Mini-Projects.			
Planned timetable:	To be arranged.			
The last twenty years has seen an explosion of genomics data through advances in new sequencing technologies. Computational tools are playing a central role in genomics: from assembling of DNA sequences to analysing genomes in order to locate genes, similarities between sequences of different organisms, and evolutionary histories of populations and species. In this module, you will be introduced to the bioinformatics tools necessary to perform genome analysis. Students will gain practical experience using essential Python programming skills. Building on this, students will gain an appreciation of bioinformatics and its applications in genomic studies of Evolutionary Biology and Biomedicine.				
Pre-requisite(s):	Before taking this module you must pass BL3320			
Learning and teaching methods of delivery:	**Weekly contact**: 1 lecture (x7 weeks) and/or 1 workshop (x7 weeks)			
	Scheduled learning: 28 hours		**Guided independent study:** 124 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 10%, Coursework = 90%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Coursework = 100%			
Module coordinator:	Dr C Kosiol			
Module coordinator Email:	ck202@st-andrews.ac.uk			
Module teaching staff:	Dr C Kosiol, Dr N Bailey, Dr P Thorpe, Prof J Jones, Prof O Gaggiotti			

BL4274 Evolutionary Developmental Biology

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
Evolution of new morphologies involves changes to the development of organisms. The field of evolutionary developmental biology is thus established as a major and essential component of any comprehensive understanding of evolutionary biology. This module aims to cover some of the main, current themes in evolutionary developmental biology.				
Pre-requisite(s):	Permission of Biology Honours Adviser required			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar (x 10 weeks).			
	Scheduled learning: 20 hours		**Guided independent study:** 130 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 50%, Coursework = 50%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Resubmission of failed item(s) of Coursework			
Module coordinator:	Dr D E K Ferrier			
Module teaching staff:	Dr D Ferrier, Dr I Somorjai			

BL4278 Biology of Dinosaurs and Other Extinct Vertebrates

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
It seems natural to use our understanding of extant biology to make inferences about the past. This allows us to test ideas about evolution and biodiversity in a wider context. Additionally, rewilding is an active but controversial strand of conservation biology that suggests that where keystone species have gone extinct, we should introduce an analogous species. Vertebrates fossilise well, and so offer a good foundation of source material. They are generally large and complex organisms, and we particularly focus on the large representatives of each taxonomic group; this allows us to explore the physical constraints on the functioning of organisms.				
Pre-requisite(s):	Permission of Biology Honours Adviser required			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar (x 10 weeks).			
	Scheduled learning: 20 hours		**Guided independent study:** 130 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 35%, Coursework = 15%			
	As used by St Andrews: 2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	2-hour Written Examination = 50%, Existing Coursework = 50%			
Module coordinator:	Professor G D Ruxton			
Module teaching staff:	Prof G Ruxton			

BL4279 The CRISPR system for Antiviral Defence and Genome Engineering

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged			
The discovery of the CRISPR system, which provides adaptive antiviral immunity in prokaryotes, has made facile genome engineering a reality. This has resulted in an ongoing revolution in molecular biology and opened the door to a wide variety of applications in healthcare, agriculture and biotechnology. It also raises many ethical considerations. In this module, students will study the molecular biology of the CRISPR system in prokaryotes in depth, touching on the history of discovery, biological mechanisms and the context of antiviral defence systems. Building on this, students will gain an appreciation of the potential applications of this technology in biotechnology and healthcare, and develop a proposal for a novel application, taking into account the practical and ethical considerations.				
Pre-requisite(s):	Before taking this module you must pass BL3302			
Learning and teaching methods of delivery:	**Weekly contact**: Across the semester: 6 x 1h lectures, 4 x 1h tutorials, 3 x 3h seminars			
	Scheduled learning: 19 hours		**Guided independent study:** 132 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 40%, Practical Examinations = 0%, Coursework = 60%			
	As used by St Andrews: Coursework = 60%, 1.5-hour Written Examination = 40%			
Re-assessment pattern:	Coursework = 60%, 1.5-hour Written Examination = 40%			
Module coordinator:	Professor M F White			
Module teaching staff:	Prof M White			

BL4281 Animal Communication and Cognition

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
Learning to produce sounds is a particularly interesting subject as far as humans are concerned because it is such a notable feature of our own species. Why do we show it, and how did it evolve? As there is little evidence of it in any other primates we need to look further afield for clues. It is found in several other mammalian orders and in three orders of birds, and the evidence for it and nature of it will be examined in these examples. We will discuss why selection may have favoured it in each case. We will also consider vocal learning in a broader sense, including its use in animals that do not themselves produce sounds.				
Pre-requisite(s):	Permission of Biology Honours Adviser required			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar (x 10 weeks).			
	Scheduled learning: 0 hours		**Guided independent study:** 0 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 0%			
	As used by St Andrews: 2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	2-hour Written Examination = 50%, Existing Coursework = 50%			
Module coordinator:	Professor V Janik			
Module teaching staff:	Prof V Janik, Dr T Gotz, Dr J Oswald			

BL4282 Biology and Behaviour of Social Insects

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
This module will examine and compare the biology of the four main groups of social insects: termites, ants, wasps and bees. Sociality in other groups (aphids, beetles) will also be considered briefly. Topics will include the evolution of sociality, social organisation and social control systems, reproductive strategies, and diverse communication modes including pheromonal systems, acoustic systems, and 'bee dances'. Aspects of foraging behaviour and learning abilities will also be considered, particularly for ants (leaf cutter ants, army ants, slave-making ants) and for bees both eusocial and semi-social. There will be strong evolutionary, ecological and behavioural themes, and relevance also to conservation issues.				
Pre-requisite(s):	Permission of Biology Honours Adviser required			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 3-hour seminar (x 11 weeks).			
	Scheduled learning: 33 hours		**Guided independent study:** 117 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Resubmission of failed item(s) of Coursework			
Module coordinator:	Dr D M Shuker			
Module teaching staff:	Dr David Shuker			

BL4285 Complex Systems in Animal Behaviour

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
Behaving animals form complex systems, and can create complicated and beautiful phenomena, such as flocks of birds, termite nests, and patterns of army ant swarms. This course will look at research that examines animal behaviour from a complex systems perspective, where analyses range from captive housing of entire bird flocks, computer simulation, and use of robots to interact with the animals. Introductory lectures will be followed by seminar-style discussion of the primary literature, computer practicals, and hands-on practicals where students will identify complex systems in animal behaviour in the world around them.				
Pre-requisite(s):	Permission of Biology Honours Adviser required			
Learning and teaching methods of delivery:	**Weekly contact**: 14 x 1-hour seminars plus 2 x 2-hour computer-based practical classes over 8 weeks			
	Scheduled learning: 22 hours		**Guided independent study:** 128 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 25%, Practical Examinations = 0%, Coursework = 75%			
	As used by St Andrews: 2-hour Written Examination = 25%, Coursework = 75%			
Re-assessment pattern:	2-hour Written Examination = 25%, Existing Coursework = 75%			
Module coordinator:	Dr V A Stokes			
Module teaching staff:	Dr V A Smith			

BL4286 Advanced Topics in Evolution

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
In this module, we will consider outstanding questions in modern Evolutionary Biology to develop a detailed understanding of research issues in this field. Both molecular and whole organismal approaches will be addressed. Topics will be based on classic papers in the literature raising theoretical questions about the origin of species, adaptation, genetic drift and natural and sexual selection. Each classic paper will be combined with a recently published study addressing one of these theoretical topics. We will use tutorials and student-led seminars to address the topics in detail. The result will be an exciting opportunity to tackle classic topics in evolution and learn how the very latest research addresses these issues.				
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar (x 10 weeks).			
	Scheduled learning: 20 hours		**Guided independent study:** 130 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 50%, Coursework = 0%			
	As used by St Andrews: 2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	2-hour Written Examination = 50%, Existing Coursework = 50%			
Module teaching staff:	Dr N Bailey, Dr David Ferrier			

BL4288 Major Review Paper in Evolutionary Biology

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged			
Students will prepare a major review paper, reviewing a current topic in evolutionary biology. Extensive one-to-one work with staff will afford students the opportunity to produce a highly polished article. The paper will be submitted for peer (classmate) review, and will receive editorial guidance on changes from staff before a final version is submitted.				
Pre-requisite(s):	Before taking this module you must pass BL3307			
Anti-requisite(s)	You cannot take this module if you take BL5440			
Learning and teaching methods of delivery:	**Weekly contact**: 2-hour seminar (x 5 weeks), 1-hour tutorial (week 3,4,6)			
	Scheduled learning: 13 hours		**Guided independent study:** 138 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Coursework = 100%			
Module coordinator:	Dr M B Morrissey			
Module teaching staff:	Dr M Morrissey , Dr A Gardner, Prof O Gaggiotti			

BL4289 Animal Cognition

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged			
In this module we will investigate the cognitive abilities of animals, with particular interest in understanding the adaptive value of those abilities. This means that although we will develop an understanding of animal cognition based on standard animal models (typically rats and pigeons), we will extend those principles to addressing cognitive abilities in 'real' animals behaving in the 'real' world. We will use Shettleworth's book, already the key animal cognition text, as our starting point with student-led seminars providing breadth by presenting examples from the recent burgeoning of literature on non-model animals. The result will be a stimulating opportunity to develop a critical understanding of how animals perceive their world, how their cognitive abilities are shaped by that world and how those abilities lead to reproductive success.				
Pre-requisite(s):	Before taking this module you must pass BL3319			
Anti-requisite(s)	You cannot take this module if you take BL5441			
Learning and teaching methods of delivery:	**Weekly contact**: 2-hour seminar (x 10 weeks)			
	Scheduled learning: 20 hours		**Guided independent study:** 133 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Coursework = 100%			
Module coordinator:	Professor S D Healy			
Module teaching staff:	Prof S Healy			

BL4294 Biomolecular Sciences Public Engagement

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2021-2022			
Planned timetable:	To be confirmed			
The aims of this module are to: (1) Enable biomolecular sciences students (Cell Biology, Molecular Biology, Biochemistry and Biology & Chemistry) to explore the role of biomolecular sciences public engagement in society. (2) To gain hands on experience of planning, delivering and reflecting on a public engagement assignment using a combination of academic and practical learning approaches, students will consider the role of public engagement while developing their planning, communication and reflective skills.				
Pre-requisite(s):	Before taking this module you must pass BL3301 and pass BL3302			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (3 weeks), 4 workshops, 1 presentation, PE event			
	Scheduled learning: 21 hours		**Guided independent study:** 132 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Coursework = 100%			
Module coordinator:	Dr J Nairn			
Module coordinator Email:	jn37@st-andrews.ac.uk			
Module teaching staff:	Dr J Nairn, Dr T Gloster, Dr J Sleeman, Dr D Hughes, Dr M Stewart			

BL4301 Polar Ecology: Antarctica

SCOTCAT Credits:	15	SCQF level 10	**Semester**	Full Year
Academic year:	2021-2022			
Availability restrictions:	To be confirmed			
Planned timetable:	To be arranged.			
This module offers students the opportunity to gain experience in polar ecology with special emphasis on top predators (cetaceans, pinnipeds, sea birds), ecosystem functionality and management of Antarctic marine living resources. Through a series of specialist lectures, workshops and group discussions students will gain in-depth understanding and critical awareness of the current scientific, conservation and management challenges of the Antarctic ecoregion. Students will learn to work with a variety of datasets documenting different aspects of the marine Antarctic ecosystem, from oceanography to survey data of key top-predators. Due to the ongoing travel restrictions there will be no expedition to Antarctica as part of this module, so there is also no extra cost involved in taking this module.				
Pre-requisite(s):	Before taking this module you must pass BL2307 or pass BL3308 or pass BL3318			
Learning and teaching methods of delivery:	**Weekly contact**: 8 lectures in S1 & 2 lectures in S2 plus 4 workshops			
	Scheduled learning: 100 hours		**Guided independent study:** 50 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 50%, Coursework = 50%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Resubmission of failed item(s) of Coursework			
Module coordinator:	Dr S Heinrich			
Module teaching staff:	Dr S Heinrich, Dr L Boehme			

BL4603 External Research Placement

SCOTCAT Credits:	90	SCQF level 10	**Semester**	Full Year
Academic year:	2021-2022			
Availability restrictions:	Only available to students on MBiochem, MBiol or MMarBiol programmes			
Planned timetable:	To be arranged			
The module constitutes an independent 7-12 month external research placement hosted by an independent institute/company. The project will be fully supervised at the host institute/company and student performance will be assessed jointly by the immediate supervisor and a member of staff in the School of Biology. During the module students will have the opportunity to practise and learn a range of scientific and generic skills, including an element of independent working, in a working environment outside St Andrews. Ultimately, the module will allow students to gain substantial research experience and work experience thus enhancing their future employability.				
Anti-requisite(s)	You cannot take this module if you take BL4602			
Learning and teaching methods of delivery:	This is a Study Abroad or External Placement module			
	Weekly contact: Some placement providers offering dual delivery placements			
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Coursework = 100%			
Module coordinator:	Dr J Nairn			

BL4797 Joint Honours Project

SCOTCAT Credits:	60	SCQF level 10	**Semester**	Full Year
Academic year:	2021-2022			
Availability restrictions:	Available to students only on approved Joint Honours BSc degrees, in the second year of the Honours Programme.			
Planned timetable:	tbc			
This project will involve extensive research to investigate a defined problem within the intersection of biology and the joint degree subject, appropriate to the degree programme being studied by each student. The project will involve diligence, initiative and independence in pursuing the literature, good experimental design, good experimental and/or analytical technique, and excellent record keeping. The project will culminate in the production of a high-quality report that demonstrates a deep understanding of the chosen area of research. Students will be allocated to a member of staff within the School of Biology and their joint School who will guide and advise them in research activities throughout the academic year.				
Pre-requisite(s):	Permission of Biology Honours Adviser required; Joint project letter of agreement must be signed.			
Anti-requisite(s)	You cannot take this module if you take another project or dissertation module.			
Learning and teaching methods of delivery:	**Weekly contact**: 1 lecture (2 weeks), 2 tutorials (1 week), 1 one-to-one submission (22 weeks)			
	Scheduled learning: 33 hours		**Guided independent study:** 567 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 20%, Coursework = 80%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Coursework = 100%			
Module coordinator:	Professor S D Healy			
Module teaching staff:	Professor Susan Healy			

BL5000 Biology Distance Learning (MBioChem/MBiol)

SCOTCAT Credits:	30	SCQF level 11	**Semester**	Full Year
Academic year:	2021-2022			
Availability restrictions:	Only available to students on the MBiochem and MBiol			
Planned timetable:				

This module is appropriate for students on the MBioChem degree and those MBiol students with molecular or cellular interest. This distance learning module will look in detail at the processes involved in creating a scientific research project. The aim of the module is for the students to develop independent thought in experimental design. While on placement a series of online assessments will test the students' ability to critically analyse research literature identify core and specialised techniques in the biosciences design experiments for specific research questions quantitatively and statistically analyse data and publish research in the appropriate manner. The students should ultimately gain valuable skills necessary for successful independent research careers.

Anti-requisite(s)	You cannot take this module if you take BL4601
Learning and teaching methods of delivery:	This is a Study Abroad or External Placement module
	Weekly contact: 5 hours of tutorials over the semester
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%
	As used by St Andrews: Assessment consists of 100% coursework
Re-assessment pattern:	Re-assessment consists of 100% coursework. Resubmission of failed item(s) of Coursework
Module coordinator:	Dr J Nairn
Module teaching staff:	Dr Jacqueline Nairn, Dr Gerald Prescott, Dr Ulrich Schwarz-Linek, Dr V Anne Smith, Prof Martin Ryan

BL5411 Advanced Topics in Biology

SCOTCAT Credits:	30	SCQF level 11	**Semester**	Full Year
Academic year:	2021-2022			
Availability restrictions:	Enrolment is restricted to students on the MMarBiol and MBiol programmes			
Planned timetable:	To be arranged			

This module will allow you to develop advanced skills in data analysis and academic writing. You will have the opportunity to develop your 4th year placement research into a publication standard primary research article, mentored by a member of academic staff. You will then consider how to develop your research area into a funding application. Your learning throughout the module will be supported by 1:1 tutorials that will guide the development of your research article and research proposal.

Pre-requisite(s):	null	
Learning and teaching methods of delivery:	**Weekly contact**: 2 x 2-hour seminars (x 6 weeks), 1-hour tutorial (x 6 week), 1-hour seminar (x 22 weeks)	
	Scheduled learning: 52 hours	**Guided independent study:** 253 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%	
	As used by St Andrews: Coursework = 100%	
Re-assessment pattern:	Coursework = 100%	
Module coordinator:	Dr I M Matthews	
Module teaching staff:	Team Taught	

BL5421 Chromatin and Genome Stability

SCOTCAT Credits:	15	SCQF level 11	**Semester**	2
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
This module will introduce you to the fundamental concepts of chromatin structure and function and how this affects genome stability. DNA repair and telomere maintenance are perhaps the most significant factors affecting genome stability and these processes are central to the understanding of cancer cell biology. Indeed, most existing anti-cancer agents induce DNA damage and current efforts to target chromatin factors therapeutically are showing promise. You will have the opportunity to independently research and present seminars on the applied biology of chromatin and DNA repair within model organisms such as budding yeast, Caenorhabditis elegans and Drosophila melanogaster. The seminars and student presentations will be supplemented with guest lectures from scientists at the cutting edge of chromatin research and students will also have the opportunity to engage in research debates on topics at the forefront of modern cancer biology. Importantly, you will be expected to design and defend a research proposal that addresses an unsolved question of your choice within the field of genome stability.				
Pre-requisite(s):	Before taking this module you must pass BL3302			
Learning and teaching methods of delivery:	**Weekly contact**: 1 x 2-hour seminar.			
	Scheduled learning: 0 hours		**Guided independent study:** 0 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 0%			
	As used by St Andrews: 1.5-hour Written Examination = 20%, Coursework = 80%			
Re-assessment pattern:	1.5-hour Written Examination = 20%, Existing Coursework = 80%			
Module coordinator:	Dr H C Ferreira			
Module teaching staff:	Dr H Ferreira			

BL5441 Animal Cognition

SCOTCAT Credits:	15	SCQF level 11	**Semester**	1
Academic year:	2021-2022			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
In this module we will investigate the cognitive abilities of animals, with particular interest in understanding the adaptive value of those abilities. This means that although we will develop an understanding of animal cognition based on standard animal models (typically rats and pigeons), we will extend those principles to addressing cognitive abilities in 'real' animals behaving in the 'real' world. We will use Shettleworth's book, already the key animal cognition text, as our starting point with student-led seminars providing breadth by presenting examples from the recent burgeoning of literature on non-model animals. The result will be a stimulating opportunity to develop a critical understanding of how animals perceive their world, how their cognitive abilities are shaped by that world and how those abilities lead to reproductive success.				
Learning and teaching methods of delivery:	**Weekly contact**: 2-hour seminar (x 10 weeks),			
	Scheduled learning: 20 hours		**Guided independent study:** 132 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 50%, Coursework = 0%			
	As used by St Andrews: 2-hour Written Examination = 50%, Presentation = 50%			
Re-assessment pattern:	3-hour Written Examination = 100%			
Module coordinator:	Professor S D Healy			
Module teaching staff:	Prof S Healy			

BL5443 Biology Distance Learning (MMarBiol/MBiol)

SCOTCAT Credits:	30	SCQF level 11	**Semester**	Full Year
Academic year:	2021-2022			
Availability restrictions:	Only available to students on the MBiol and MMarBiol programmes			
Planned timetable:				

This module is appropriate for students on the MMarBiol degree and those MBiol students with organismal or ecological interest. This distance learning module will look in detail at the processes involved in creating a scientific research project. The aim of the module is for the students to develop independent thought in experimental design. While on placement a series of online assessments will test the students' ability to critically analyse research literature, identify core and specialised techniques in the biosciences, design experiments for specific research questions, quantitatively and statistically analyse data and publish research in the appropriate manner. The students should ultimately gain valuable skills necessary for successful independent research careers.

Anti-requisite(s)	You cannot take this module if you take BL4601
Learning and teaching methods of delivery:	This is a Study Abroad or External Placement module
	Weekly contact: 1 hour tutorial (5 weeks)
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%
	As used by St Andrews: Coursework = 100%
Re-assessment pattern:	Coursework = 100%
Module coordinator:	Professor O E Gaggiotti
Module teaching staff:	Prof O Gaggiotti, Dr S Northridge, Dr V A Smith

BL5498 Advanced Research Project (MMarBiol/MBiol)

SCOTCAT Credits:	60	SCQF level 11	**Semester**	Full Year
Academic year:	2021-2022			
Availability restrictions:	Open only to students enrolled in the MBiol and MMarBiol Degrees.			
Planned timetable:	Not applicable			
This module will involve the development of advanced research project to investigate a defined problem within the fields of marine biology or general ecology, appropriate to the MBiol and MMarBiol degrees. The time spent on this module will be divided between practical work, reading literature related to the project, analyzing the data generated during the practical work and writing, as well as preparing and delivering a presentation on the project. Students will be supervised by a member of staff (supervisor) within the School of Biology who will guide and advise them in research activities throughout the academic year. Students are also expected to meet their supervisor on a regular basis. They may also attend seminars and the lab meetings of the group they work with.				
Pre-requisite(s):	Before taking this module you must pass BL4603			
Learning and teaching methods of delivery:	**Weekly contact**: Students are expected to typically spend approximately 25 hours a week on their project, divided between practical work, data analysis, reading and writing.			
	Scheduled learning: 28 hours		**Guided independent study:** 572 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Coursework = 100%			
Module coordinator:	Dr S P Northridge			
Module coordinator Email:	spn1@st-andrews.ac.uk			
Module teaching staff:	Dr S Northridge			

BL5499 Advanced Research Project (MBiochem/MBiol)

SCOTCAT Credits:	60	SCQF level 11	**Semester**	Full Year
Academic year:	2021-2022			
Availability restrictions:	Only available to students on the MBiochem and MBiol			
Planned timetable:	variable, as needed			
This project will involve extensive and advanced laboratory work to investigate a defined problem within biochemistry, appropriate to the MBiochem and MBiol degrees. The project will involve initiative and independence in experimental design and in pursuing the literature, excellent experimental and analytical techniques. The project will begin with an assessed project proposal and culminate in the production of a high-quality dissertation that integrates an awareness of the project subject and a critical, extensive and detailed knowledge of the relevant theories, concepts and principals. Students will be allocated to a member of staff within the School of Biology who will guide and advise them in research activities throughout the academic year. The project will be presented in the form of a proposal, a research dissertation, an oral presentation and a viva.				
Pre-requisite(s):	Before taking this module you must pass BL4601 and pass BL4602			
Learning and teaching methods of delivery:	**Weekly contact**: 1 dedicated meeting with supervisor per week.			
	Scheduled learning: 33 hours		**Guided independent study:** 567 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Resubmission of failed item(s) of Coursework			
Module coordinator:	Dr C S Adamson			
Module teaching staff:	Individual Supervisors across the School of Biology			