

School of Biology

Head of School

Professor G Taylor

Taught Programmes

Postgraduate Certificate:	Sustainable Aquaculture (Vertebrates) Sustainable Aquaculture (Invertebrates)
Postgraduate Diploma:	Sustainable Aquaculture
M.Sc.:	Sustainable Aquaculture
M.Res.:	Ecosystem-Based Management of Marine Systems Environmental Biology Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences

Programme Requirements

Ecosystem-Based Management of Marine Systems

Taught Element:	20 credits: BL5303 at least 60 credits:(BL5301 or BL5008), (BL5111 or BL5021), (ID5001 or ID5012), MT5753, BL5321 at least 40 credits: BL5302, BL5322, BL5323, BL5324, BL5124
M.Res.:	120 credits from the Taught Element, plus BL5399 (60- credit Research Project module)

Environmental Biology

Taught Element:	90 - 95 credits from compulsory modules: BL5015, BL5016, BL5018, BL5020, BL5021, (ID5011 or ID5012), MT5753 and 30 credits from optional modules: BL5009, BL5011, BL5012, BL5013, BL5123, BL5124, MT5751
M.Res.:	120 - 125 credits from the Taught Element, plus BL5019 (60-credit Research Project module)

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Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences

Taught Element:	90 - 95 credits from compulsory modules: BL5008, BL5015, BL5016, BL5018, BL5020, (ID5011 or ID5012), MT5753 and 30 credits from optional modules: BL5009, BL5011, BL5012, BL5013, BL5123, BL5124, MT5751, MT5754, MT5755
M.Res.:	120 – 125 credits from the Taught Element, plus BL5019 (60-credit Research Project module)

Marine Mammal Science

Taught Element:	100 credits from compulsory modules: BL5103, BL5104, BL5111, BL5112, BL5201, BL5202, MT5753 and 20 credits from optional modules: BL5011, BL5121, BL5122, BL5123, BL5124, MT5751
M.Res.:	120 credits from the Taught Element, plus BL5199 (60-credit Research Project module)

Sustainable Aquaculture

Postgraduate Certificate:	Sustainable Aquaculture (vertebrates) BL4801, BL4804, BL5807, BL5809 and 2 of BL5802, BL5804, BL5805
Postgraduate Certificate:	Sustainable Aquaculture (invertebrates) BL4801, BL4803, BL5806, BL5808 and 2 of BL5802, BL5804 and BL5805.
Postgraduate Diploma:	120 credits from BL4801, BL4802 or (BL4803 and BL4804), BL5801 or (BL5806 and BL5807), BL5802, BL5803 or (BL5808 and BL5809), BL5804, BL5805 and two of (BL5821, BL5822, BL5823, BL5824, BL5825)
M.Sc.:	120 credits as for the Postgraduate Diploma plus BL5899.

For all Masters degrees there are exit awards available that allow suitably-qualified candidates to receive a Postgraduate Certificate or Postgraduate Diploma.

Biology (BL) Modules

BL5008 Applied Ecology				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
The central objective of the module will be to provide an overview of the elements of ecology and evolution that apply directly to environmental issues. The ecology section will address single-species populations and their growth, competition and its consequences, and predation and related processes. The evolution section will address variation and its genetic basis, selection, sociality, and sex. This will enable students to achieve a synthesis between their previous training and modern approaches to ecology and evolution, as a prelude to the more specialist topics in later modules.				
Programme module type:	Compulsory for M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programme Optional for M.Res. in Ecosystem-based Management of Marine Systems.			
Learning and teaching methods and delivery:	2 x 3-hour tutorials each week for 3 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr S Hubbard			

BL5009 Plant Responses to their Environment				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
This module examines the ways in which plants interact with their physical, chemical and biological environments, and how human beings influence these interactions. Examples of responses at the cellular and molecular level will be examined within the wider context of the response of the whole organism to different environmental conditions, and particular emphasis will be placed on formulation of hypotheses and on experimental methods. The aim is to provide the student with a knowledge of fundamental plant processes and of how the environment influences plant growth in 'nature' and in agricultural systems.				
Programme module type:	Optional for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.			
Learning and teaching methods and delivery:	3 lectures, 1 tutorial and 1 practical each week for 2 weeks.			
Assessment pattern:	Coursework = 40%, 1.5-hour Examination = 60%			
Module Co-ordinator:	Prof J A Raven			

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BL5011 Conservation Biology			
SCOTCAT Credits:	10	SCQF Level 11	Semester: 1
Planned timetable:	To be arranged.		
This module will cover the measurement of biodiversity, the meaning of biodiversity, factors determining extinction risk for local populations, and the effect of spatial variation on biodiversity. Practical sessions will include an introduction to diversity measurement (including sampling issues, computer packages and interpretation of output), population viability analysis, and the use of "environmental futures" to guide research strategies.			
Programme module type:	Optional for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.		
Pre-requisite(s):		Anti-requisite(s):	BL5321
Learning and teaching methods and delivery:	5 lectures each week for 2 weeks, 1 tutorial, 1 practical class and 1 workshop.		
Assessment pattern:	Coursework = 40%, 2-hour Examination = 60%		
Module Co-ordinator:	Dr A Ojanguran		

BL5012 Environmental Genomics			
SCOTCAT Credits:	10	SCQF Level 11	Semester: 2
Planned timetable:	To be arranged.		
In general terms, this module will consider how a knowledge of the organisation and expression of an organism's genome can (a) inform our understanding of its relationship with its environment and (b) facilitate advanced approaches to environmental monitoring. Specifically, the module will describe current approaches to genome analysis, and will present examples to illustrate the application of modern genomic and proteomic techniques to aspects of microbial ecology, host/parasite interactions and plant evolution.			
Programme module type:	Optional for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.		
Learning and teaching methods and delivery:	3 lectures, 1 tutorial each week for 2 weeks and 1 practical class.		
Assessment pattern:	Coursework = 40%, 1.5-hour Examination = 60%		
Module Co-ordinator:	Dr A Flavell		

BL5013 Environmental Microbiology and Ecotoxicology				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
<p>This module will provide a foundation for understanding the principles underpinning environmental microbiology and ecotoxicology. Students will be introduced to the physico-chemical parameters which regulate microbial growth in natural environments and the strategies that microorganisms have evolved which enable them to grow in extreme environments. Having gained an overview of the key processes regulating microbial growth, the focus will shift to the consideration of specific case studies. These will include the biogeochemical cycling of nitrogen and sulfur and how an understanding of these processes can be exploited to control eutrophication and bioremediate contaminated soils and water. The final element of this module will be to introduce principles of ecotoxicology and provide an understanding of the origins, significance, and fate and management strategies for the control and removal of environmental pollutants.</p>				
Programme module type:	Optional for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.			
Learning and teaching methods and delivery:	3 lectures, 1 tutorial each week for 2 weeks and 1 practical class.			
Assessment pattern:	Coursework = 40%, 1.5-hour Examination = 60%			
Module Co-ordinator:	Prof G A Codd			

BL5015 Essential Scientific Skills and Legislation				
SCOTCAT Credits:	0	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
<p>The module is designed to provide an introduction to fundamental research requirements including core laboratory and fieldwork skills to enable safe research in both laboratory and the field. Seminars and lectures will cover the University Safety Policy, Risk Assessment, Fire Safety, COSHH Regulations and relevant legislation for performing research in the UK.</p>				
Programme module type:	Compulsory for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.			
Learning and teaching methods and delivery:	1 lecture and 1 seminar.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr N Hazon			

BL5016 Modelling Ecological Dynamics				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
<p>This module is designed to provide training in the construction and use of mathematical models of ecological systems. The module will start with basic dynamical concepts and mathematical tools, and will begin at the level of individual organisms. We then develop methods appropriate to single species populations and interacting populations, leading to more complex ecological communities and ecosystems. Students will be encouraged to develop mathematical models based on the ecological concepts taught in lectures, and will explore their properties using analytical approaches and also computer simulations.</p>				
Programme module type:	Compulsory for Environmental Biology Taught Postgraduate Programme.			
Pre-requisite(s):	BL5021	Anti-requisite(s):	MT5752	
Learning and teaching methods and delivery:	5 hours of lectures each week for 4 weeks and 4 hours of practicals and 1 tutorial each week for 4 weeks			
Assessment pattern:	Coursework = 60%, 2-hour Written Examination = 40%			
Module Co-ordinator:	Dr S Smout			

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BL5018 Case Studies in Environmental Biology				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	1 & 2 (taught twice)
Planned timetable:	To be arranged.			
<p>Students will study a series of Case Studies in Environmental Biology linked to the specialist knowledge modules studied in the first semester. Each case study will consist of a lecture component linked to a workshop in which a specific scientific topic will be analyzed. The workshops will include use of database design and management, the use of the internet to run desktop experiments using public databases, field studies and laboratory studies where appropriate. Students will prepare talks, posters and internet based presentations as a means of communicating the outcomes of the workshops to the 'general public'. Concurrent to each case study there will be a seminar programme consisting of student presentations critically evaluating specific research papers.</p>				
Programme module type:	Compulsory for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.			
Learning and teaching methods and delivery:	1 lecture, 1 seminar each week for 8 weeks and additional workshops.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Prof S F Hubbard			
Lecturer(s)/Tutor(s):				

BL5019 Research Project				
SCOTCAT Credits:	60	SCQF Level 11	Semester:	Whole Year
Planned timetable:	To be arranged.			
<p>The project will involve the study of a defined problem within the area of environmental biology appropriate to the modules studied by each student. This will involve the design of experiments; the gathering collation and analysis of data; and the discussion of results on their own and in the light of existing literature. The project will be written up in the form of a research dissertation or where appropriate the report may be in the form of a manuscript suitable for submission to a journal.</p>				
Programme module type:	Compulsory for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.			
Learning and teaching methods and delivery:	To be arranged.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Prof S F Hubbard			

BL5020 Biodiversity in Agro-Ecosystems				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
<p>This module will introduce students to the special considerations which apply when attempting to measure and enhance biodiversity in habitats in or adjacent to farmland. These habitats are subject to a range of ecological constraints not associated with more natural environments, and which arise almost entirely out of the management prescriptions associated with farming practices. The module will examine in particular the extent to which traditional ecological principles can be applied to agro-ecosystems, the notion of stability and sustainability in such systems, the role of disturbance in reducing biodiversity, the effects of farming practices on trophic structure in agro-ecosystems, the statistical description and modelling of agricultural biodiversity for predictive purposes.</p>				
Programme module type:	Compulsory for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.			
Co-requisite(s):		Required for:	MT5754	
Learning and teaching methods and delivery:	5 hours of lectures each week for 2 weeks and 3 hours of practicals each week for 2 weeks			
Assessment pattern:	Coursework = 60%, 2-hour Written Examination = 40%			
Module Co-ordinator:	Prof S F Hubbard			
Lecturer(s)/Tutor(s):				

BL5021 Basic Concepts in Mathematical and Statistical Analysis				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
<p>This module will provide students with the basic skills and knowledge required for subsequent compulsory modules on Ecological Dynamics and Statistical Modelling. It will demonstrate the unifying concepts underlying all mathematical and statistical modelling of biological systems, and familiarise students with basic notation, model formulation and probability theory. This will be achieved through a series of tightly linked lectures, practicals, tutorials and workbooks. In the course of the module, students will develop increasingly complex and realistic models which will then be confronted with data from a particular ecological system.</p>				
Programme module type:	<p>Compulsory for M.Res. in Environmental Biology, M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.</p> <p>Optional for M.Res. in Ecosystem-based Management of Marine Systems</p>			
Anti-requisite(s):	BL5011	Required for:	BL5016	
Learning and teaching methods and delivery:	3 lectures, 2 tutorials and 3 practical classes.			
Assessment pattern:	Coursework = 75%, 1.5-hour Examination = 25%			
Module Co-ordinator:	Dr S Smout			

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BL5103 Population Biology of Marine Mammals				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
The module reviews the fundamental concepts of population dynamics (growth, density dependence, stability, population structure) and how these are interpreted in the light of the various life-history strategies adapted by different species of marine mammals. It then examines topics in population genetics, trophic interactions and spatial dynamics. The module also covers practical issues involved in population viability analysis and anticipated future developments in integrative modelling approaches.				
Programme module type:	Compulsory for M.Res. in Marine Mammal Science			
Learning and teaching methods and delivery:	4 lectures, 1 seminar and 1 practical class each week for 3 weeks.			
Assessment pattern:	Coursework = 50%, 1.5-hour Examination = 50%			
Module Co-ordinator:	Dr S Heinrich			

BL5104 Conservation and Management of Marine Mammals				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
From the heated debates surrounding whaling to calls for seal culls to protect commercial fish stocks, issues pertaining to marine mammals feature regularly in the public domain and often polarise public opinion. Finding ways to address human-marine mammal conflicts and advise on mitigation have become important tasks for many marine mammal scientists. Through a series of lectures, seminars, debates and workshops, students will explore human-marine mammal interactions to better understand the underlying factors. They will learn to critically evaluate current conservation and management issues and will explore ways in which sound science can contribute to alleviate existing and future conflicts.				
Programme module type:	Compulsory for M.Res. in Marine Mammal Science			
Learning and teaching methods and delivery:	3 lectures and 2 seminars each week for 4 weeks.			
Assessment pattern:	Coursework = 50%, 1.5-hour Examination = 50%			
Module Co-ordinator:	Dr S Heinrich			

BL5111 Essential Methods in Marine Mammal Science 1				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
This module provides the basic numerical and computational skills necessary for visualising and summarising data sets. It is designed as a primer for more advanced courses in statistical modeling and also as an introduction to the computer language R. The examples and computer practicals are motivated from the ecological literature.				
Programme module type:	Compulsory for M.Res. in Marine Mammal Science Optional for M.Res in Ecosystem-based Management			
Anti-requisite(s):	BL5021			
Learning and teaching methods and delivery:	5 lectures and 2 practical classes each week for 2 weeks, tutorials and 1 seminar.			
Assessment pattern:	Coursework = 50%, 1.5-hour Examination = 50%			
Module Co-ordinator:	Dr S Smout			

BL5112 Research Methods in Marine Mammal Science				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Whole Year
Planned timetable:	To be arranged.			
This module will provide an overview of the wide range of methodologies applied in the field of marine mammal science. Lectures will introduce different techniques for sampling individual animals, animal behaviour, abundance and distribution. Students will learn to plan research activities and apply different technical approaches to data collection, processing and analysis.. During the optional field trip students will put into practice many of the theoretical aspects and techniques discussed in class.				
Programme module type:	Compulsory for M.Res. in Marine Mammal Science			
Learning and teaching methods and delivery:	4 x 2-hour lectures each week for 3 weeks, 1 x 2-hour tutorial each week for 3 weeks an optional 8-day field trip.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr S Heinrich			

BL5121 Current Issues in Marine Mammal Behaviour				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
Marine mammals are often seen as highly intelligent and complex in their behaviour. This module will investigate such claims by discussing current views and recent advances in the study of marine mammal social behaviour. Each student will present one topic to the class and lead the discussion on it. Topics covered will include brain evolution, dolphin signature whistles, referential communication, cetacean culture, equivalence classes, cooperation and concept formation.				
Programme module type:	Optional for M.Res. in Marine Mammal Science			
Pre-requisite(s):	BL5201			
Learning and teaching methods and delivery:	1 lecture and 9 seminars spread over 2 weeks.			
Assessment pattern:	Coursework = 50%, 1.5-hour Examination = 50%			
Module Co-ordinator:	Dr V Janik			

BL5122 Current Issues in Biologging				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
This module will present an introduction to marine mammal biologging science: the theory and practice of logging and relaying physical and biological data using animal-attached tags. Lectures will cover the technology currently available for measuring animal movements, investigating behaviour, ecology and physiology, some of the problems associated with tag design in terms of how data is stored and transmitted, and problems associated with data analysis and data display.				
Programme module type:	Optional for M.Res. in Marine Mammal Science			
Pre-requisite(s):	BL5201	Anti-requisite(s):		
Learning and teaching methods and delivery:	3 lectures, 1 seminar and 1 practical class each week for 2 weeks.			
Assessment pattern:	Coursework = 50%, 1.5-hour Examination = 50%			
Module Co-ordinator:	Dr S Hooker			
Lecturer(s)/Tutor(s):				

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BL5124 Predator Ecology in Polar Ecosystems - a Field Course in Antarctica				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	2
Planned timetable:	2 weeks, full-time			
<p>This module offers MRes students the unique opportunity to gain theoretical and practical experience in polar ecology with special emphasis on top predators (cetaceans, pinnipeds, sea birds), ecosystem functionality and management of Antarctic marine living resources. Students will participate in a two-week vessel-based expedition to Antarctica during the austral summer. This field trip involves travelling to southern Argentina, conducting at-sea surveys during transit to/ from the Antarctic Peninsula, participating in shore-based activities, and exploring Antarctic coastal waters from small boats. Through a series of specialist lectures, student-led seminars, on-board practicals, field excursions and dedicated observational studies students will gain in-depth understanding and critical awareness of the current scientific, conservation and management challenges of the Antarctic ecoregion. Upon return to St Andrews students will complete a specialist case study on a selected topic which will culminate in the presentation of a report in journal format.</p>				
Programme module type:	Optional for M.Res. in Ecosystem-Based Management of Marine Systems M.Res. in Environmental Biology and M.Res. in Marine Mammal Science.			
Pre-requisite(s):	Undergraduate degree in relevant Biological disciplines and/or admittance to St Andrews M.Res. Programmes, Medical certificate documenting fit for travel to remote Antarctica			
Anti-requisite(s):	BL4301			
Learning and teaching methods and delivery:	Lectures, seminars and practicals for 2 weeks			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr S Heinrich			

BL5199 Marine Mammal Science Research Project				
SCOTCAT Credits:	60	SCQF Level 11	Semester:	Whole Year
Planned timetable:	To be arranged.			
<p>The research project or dissertation will involve the study of a defined problem within the field of marine mammal science. Students will be required to collate and analyse data and discuss their results in the light of existing literature. In some cases, projects might also involve the design of experiments or the gathering of data. Each project will be written up in the form of a thesis.</p>				
Programme module type:	Compulsory for M.Res. in Marine Mammal Science.			
Learning and teaching methods and delivery:	To be arranged.			
Assessment pattern:	Research report or Thesis of up to 15,000 words (excluding bibliography) = 100%			
Module Co-ordinator:	Dr S Heinrich			

BL5201 Biology of Marine Mammals				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
This module introduces the zoogeography of marine mammals and the morphological, physiological and behavioural adaptations which have enabled this diverse group to successfully colonise all of the world's oceans and some freshwater systems. Students will gain an understanding of the physiological and behavioural complexity underlying movement patterns, diving, foraging, reproduction, and social dynamics of marine mammals across different temporal and spatial scales. Lectures will focus on topical issues and selected examples illustrating and contrasting some of the strategies employed by different marine mammal groups.				
Programme module type:	Compulsory for M.Res. in Marine Mammal Science			
Pre-requisite(s):	Undergraduate courses in behaviour, ecology, physiology, zoology or marine science			
Required for:	BL5121, BL5122			
Learning and teaching methods and delivery:	5 x 2-hour lectures over 3 weeks and 2 tutorials.			
Assessment pattern:	3-hour Examination = 100%			
Module Co-ordinator:	Dr S Heinrich			

BL5202 Case Studies in Marine Mammal Biology				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
Many of the most topical issues in marine mammal science revolve around ecology and behaviour. In this module, students will explore aspects of diving, foraging, reproduction and social behaviour of marine mammals in greater detail through a series of student-lead seminars, lab practicals and field excursions. Computer practicals will provide training in basic principles of GIS application and, passive acoustic techniques. Emphasis will be placed on current advances in understanding and research methods. The issues discussed here are often at the base of human-marine mammal conflicts, thus understanding the underlying ecological principles not only provides interesting insights into marine mammal biology but also yields consequences for marine mammal conservation and management.				
Programme module type:	Compulsory for M.Res. in Marine Mammal Science			
Learning and teaching methods and delivery:	2 lectures, 5 seminars, 3-hour practicals for 8 weeks and 1 daylong field trips.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr S Heinrich			

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BL5301 Tropical Marine Systems				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
This module will provide students with an advanced and focused understanding of selected tropical marine systems and the management thereof in an holistic, whole-ecosystem context. It will be run as a field course in Australia, at James Cook University's Orpheus Island field station on the Great Barrier Reef. Together with BL5302 Cold Water Marine Systems, this module will provide the foundation from which detailed knowledge and skills to measure and interpret system data can develop, together with the use of tools for whole-system analysis and management.				
Programme module type:	Optional for M.Res. in Ecosystem-Based Management of Marine Systems			
Learning and teaching methods and delivery:	15 lectures, 1 study visit (to The Great Barrier Reef Marine Park Authority), 1 mini-project and 1 practical over a 2-week residential period - prior to the start of the academic year.			
Assessment pattern:	Coursework = 50%, 3-hour Examination = 50%			
Module Co-ordinator:	Prof A Brierley			

BL5302 Cold Water Marine Systems				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
This module will build on BL5301 Tropical Marine Systems, but will focus on cold water ecosystems. Together these two modules will provide students with a broad understanding of globally-key marine systems. It will enable further detailed exploration of key systems, contrasting these to highlight significant environmental drivers. Important physical, chemical, biological and geological processes will be studied, alongside key biotic and abiotic interactions. Knowledge will be synthesised to provide students with a critical understanding of dynamic processes within and between systems. Together with BL5301 Tropical Marine Systems, this module will provide the foundation from which detailed knowledge and skills to measure and interpret systems data can develop, together with use of tools for whole system analysis and management. This module is taught at the Scottish Association for Marine Science facility at Oban, and focuses on systems with which SAMS has expertise.				
Programme module type:	Optional for M.Res. in Ecosystem-Based Management of Marine Systems			
Learning and teaching methods and delivery:	20 lectures, and 1 practical each week over 3 weeks (i.e. 3 practicals total).			
Assessment pattern:	Coursework = 50%, 3-hour Examination = 50 %			
Module Co-ordinator:	Dr D Hughes (SAMS)			

BL5303 Marine Systems Research Methods				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
The study of marine systems requires familiarity with a variety of methods of sampling the marine environment. These methods include use of the instruments and sampling devices used in physical, geological, biological, chemical and biogeochemical oceanography. The students will use these methods both on ship and in the laboratory, collecting data that they will analyze and disseminate. The module will also include development of scientific and proposal writing skills. This module is taught at the Scottish Association for Marine Science facility at Oban.				
Programme module type:	Compulsory for M.Res. in Ecosystem-Based Management of Marine Systems			
Learning and teaching methods and delivery:	7 lectures, 2 tutorials and 5 practicals in total.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr T Nickell (SAMS)			

BL5321 Marine Biodiversity and Ecosystem Function				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
This module will provide students with an advanced understanding of biodiversity issues in key marine systems. The current state of knowledge will be synthesised and the most recent theoretical approaches to the measurement of biodiversity, and the relationship between biodiversity and ecosystem function examined (the BEF debate). The concept of ecosystem services, over-yielding and habitat connectivity will be addressed. This will provide students with a modern overview of the dynamic interaction between biodiversity and system processes within and between systems.				
Programme module type:	Optional for M.Res. in Ecosystem-Based Management of Marine Systems			
Anti-requisite(s):	BL5011			
Learning and teaching methods and delivery:	14 lectures and 2 practicals over 3 weeks.			
Assessment pattern:	Coursework = 50%, 3-hour Examination = 50 %			
Module Co-ordinator:	Dr R Aspden			

BL5322 Marine Management, Policy and Planning				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
This module provides students with a broad understanding of the issues surrounding the management of marine resources. Concepts of sustainability, coastal management and marine spatial planning will be explored from the perspective of a variety of stakeholders (e.g. nature conservation, oil/gas, fisheries and renewable energy). The module will identify key concepts underpinning sustainability and develop student awareness of the complex ecological, social, economic and political issues involved in marine management. Students will also develop an in-depth marine plan for a local area, gaining valuable experience of the approaches and problems of the emerging field of marine spatial planning. This module is taught at the Scottish Association for Marine Science facility at Oban .				
Programme module type:	Optional for M.Res. in Ecosystem-Based Management of Marine Systems			
Learning and teaching methods and delivery:	17 lectures, 3 half-day practical sessions and a 1-day workshop			
Assessment pattern:	Coursework = 50%, 3-hour Examination = 50%			
Module Co-ordinator:	Dr C Fox (SAMS)			

BL5323 Advanced Modelling				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
Building on the basic concepts of modelling, and systems modelling taught at St Andrews, this module will teach, through lectures and linked practical sessions, an introduction to physical circulation models, individual and population-based spatial models and ecosystem modeling techniques. Additionally, coupled biophysical models will be taught. The module will give an overview of the different physical and biological models used in marine systems science, including the assumptions, parameters needed and some examples of these models, together with application of techniques and interpretation of outcomes. This module is taught at the Scottish Association for Marine Science facility at Oban.				
Programme module type:	Optional for M.Res. in Ecosystem-Based Management of Marine Systems			
Learning and teaching methods and delivery:	9 lectures and 8 x 3-hour practical classes over 3 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr S Heymans (SAMS)			

BL5324 Impacts on Marine Ecosystems				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
Human activities are resulting in a number of physical, chemical, biological and social changes which impact on marine systems, from the organism to the ecosystem level. This elective module will explore the various impacts of these, focusing in particular on the research expertise of SAMS scientists. Physically-driven change will concentrate on Earth's changing climate, ocean acidification and marine sound whilst chemically driven processes will focus on biogeochemical cycles, eutrophication oil contamination and marine sediment waste. Biologically driven changes will range from aquaculture, to marine aliens and finally social change will address the impact of fisheries on the marine system. This module is taught at the Scottish Association for Marine Science facility at Oban .				
Programme module type:	Optional for M.Res. in Ecosystem-Based Management of Marine Systems			
Learning and teaching methods and delivery:	12 lectures, 3 x 3-hour tutorials, and 3 practicals over the 3-week duration of the module.			
Assessment pattern:	Coursework = 50%, 3-hour Examination = 50%			
Module Co-ordinator:	Dr K Last			

BL5399 Ecosystem-Based Management of Marine Resources Research Project				
SCOTCAT Credits:	60	SCQF Level 11	Semester:	Whole Year
Planned timetable:	To be arranged.			
The research project or dissertation will involve the study of a defined problem within the field of marine systems science. Students will be required to collate and analyze data and discuss their results in the light of existing literature. In some cases, projects might also involve the design of experiments or the gathering of data. Each project will be written up in the form of a thesis.				
Programme module type:	Compulsory for M.Res. in Ecosystem-Based Management of Marine Systems			
Learning and teaching methods and delivery:	To be arranged.			
Assessment pattern:	Research report or Thesis of up to 15,000 words (excluding bibliography) = 100%			
Module Co-ordinator:	Prof A Brierley			

BL4801 Aquaculture and Fisheries				
SCOTCAT Credits:	10	SCQF Level 10	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides an introduction to the global importance of aquaculture with fisheries industries worldwide. The module will compare both aquaculture and fishing industries with terrestrial, agricultural sources of food production. The global markets for aquaculture, fisheries and agricultural products will be assessed. The environmental interactions of aquaculture will be discussed with relation to the definition of, and development of, sustainable aquaculture practices. The principles of developing sustainable aquaculture in different global environments/conditions will be discussed.				
Programme module type:	Compulsory for all Sustainable Aquaculture Taught Postgraduate Programmes			
Learning and teaching methods and delivery:	Weekly contact: Distance Learning : 1 x 2-hour lecture and 1 x 2-hour tutorial each week for 5 weeks.			
Assessment pattern:	As used by St Andrews: Coursework = 40%, 2-hour Examination = 60%			
Module Co-ordinator:	Dr N Hazon			

BL4802 Biology for Aquaculture				
SCOTCAT Credits:	20	SCQF Level 10	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides an understanding of the fundamental biology of aquaculture species. This includes the anatomy and physiology of both invertebrate and vertebrate aquaculture species. The interaction of aquaculture species with the aquatic environment and the requirements for developing sustainable aquaculture will be assessed.				
Programme module type:	Either BL4802 or (BL4803 and BL4804) is compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Anti-requisite(s):	BL4803 and BL4804			
Learning and teaching methods and delivery:	Weekly contact: Distance Learning: 1 x 2-hour lecture and 1 x 2-hour each week for 10 weeks.			
Assessment pattern:	As used by St Andrews: Coursework = 40%, 2-hour Examination = 60%			
Module Co-ordinator:	Dr N Hazon			

BL4803 Biology for Aquaculture - Invertebrates				
SCOTCAT Credits:	10	SCQF Level 10	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides an understanding of the fundamental biology of invertebrate aquaculture species. This includes the anatomy and physiology of appropriate aquaculture species. The interaction of aquaculture species with the aquatic environment and the requirements for developing sustainable aquaculture will be assessed.				
Programme module type:	Compulsory for Postgraduate Certificate in Sustainable Aquaculture (invertebrates). Either BL4802 or (BL4803 and BL4804) is compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Anti-requisite(s):	BL4802			
Learning and teaching methods and delivery:	Weekly contact: 4 hours of lectures each week for 5 weeks, and 3 hours of tutorials each week for 2 weeks.			
Assessment pattern:	As used by St Andrews: Coursework = 40%, 2-hour Examination = 60%			
Module Co-ordinator:	Dr N Hazon			

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BL5801 Nutrition				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of the anatomy, physiology and nutritional requirements of key fish and invertebrate species and a critical assessment of the sustainability of feed production technology. It will also assess and discuss the relationship between clinical nutrition and fish health, the role of microbiota in fish nutrition and the importance of nutrition in developing optimal animal welfare.				
Programme module type:	Either BL5801 or (BL5806 and BL5807) is compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Anti-requisite(s):	BL5806 and BL5807			
Learning and teaching methods and delivery:	1 lecture and 1 tutorial each week for 10 weeks.			
Assessment pattern:	Coursework = 60%, 2-hour Examination = 40%			
Module Co-ordinator:	Dr S Wadsworth			

BL5802 Management, Husbandry and Sustainability				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of production management and business management of modern aquaculture practices. Environmental, social and economic sustainability of aquaculture depends on an understanding of the interactions of differing but complementary management structures.				
Programme module type:	Compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. programmes Optional for both Sustainable Aquaculture Postgraduate Certificates.			
Learning and teaching methods and delivery:	1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 60%, 2-hour Examination = 40%			
Module Co-ordinator:	Dr P Southgate			

BL5803 Health and Disease				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of the factors that influence disease processes in cultured fish and invertebrates including viral, bacterial, parasitic and non-infectious disease. The wide range of specific causes of disease and pathology in farmed species will be discussed and the importance of operations and management on the development and impact of disease in optimising fish welfare and developing sustainable and ethical aquaculture practices will be assessed critically.				
Programme module type:	Either BL5803 or (BL5808 and BL5809) is compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Anti-requisite(s):	BL5808 and BL5809			
Learning and teaching methods and delivery:	1 lecture and 1 tutorial each week for 10 weeks.			
Assessment pattern:	Coursework = 60%, 2-hour Examination = 40%			
Module Co-ordinator:	Dr P Southgate			

BL5804 Markets, Products, Processing and Food Safety				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of aquaculture markets, products, processing and food safety. Understanding the processes of ensuring the safety and quality of aquaculture products is central to establishing efficient and sustainable aquaculture practices.				
Programme module type:	Compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes Optional for both Sustainable Aquaculture Postgraduate Certificates.			
Learning and teaching methods and delivery:	1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 60%, 2-hour Examination = 40%			
Module Co-ordinator:	Dr S Wadsworth			

BL5805 Local and Global Impacts of Aquaculture				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of the environmental impact of aquaculture practices on both local and global scales. Understanding the environmental impact of aquaculture practices is central to improving and developing sustainable aquaculture.				
Programme module type:	Compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes Optional for both Sustainable Aquaculture Postgraduate Certificates.			
Learning and teaching methods and delivery:	1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 60%, 2-hour Examination = 40%			
Module Co-ordinator:	Dr J A David			

BL5806 Nutrition - Invertebrates				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of the anatomy, physiology and nutritional requirements of key invertebrate species and a critical assessment of the sustainability of feed production technology. It will also assess and discuss the relationship between clinical nutrition and animal health and the importance of nutrition in developing optimal animal welfare.				
Programme module type:	Compulsory for Postgraduate Certificate in Sustainable Aquaculture (Invertebrates). Either BL5801 or (BL5806 and BL5807) is compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Anti-requisite(s):	BL5801			
Learning and teaching methods and delivery:	4 hours of lectures each week for 5 weeks, and 3 hours of tutorials each week for 2 weeks.			
Assessment pattern:	Coursework = 40%, 2-hour Examination = 60%			
Module Co-ordinator:	Dr N Hazon			

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BL5807 Nutrition - Vertebrates				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of the anatomy, physiology and nutritional requirements of key vertebrate species and a critical assessment of the sustainability of feed production technology. It will also assess and discuss the relationship between clinical nutrition and animal health and the importance of nutrition in developing optimal animal welfare.				
Programme module type:	Compulsory for Postgraduate Certificate in Sustainable Aquaculture (Vertebrates). Either BL5801 or (BL5806 and BL5807) is compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Anti-requisite(s):	BL5801			
Learning and teaching methods and delivery:	4 hours of lectures each week for 5 weeks, and 3 hours of tutorials each week for 2 weeks.			
Assessment pattern:	Coursework = 40%, 2-hour Examination = 60%			
Module Co-ordinator:	Dr N Hazon			

BL5808 Health and Disease - Invertebrates				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of the factors that influence disease processes in cultured fish including viral, bacterial, parasitic and non-infectious disease. The wide range of specific causes of disease and pathology in farmed species will be discussed and the importance of operations and management on the development and impact of disease in optimising fish welfare and developing sustainable and ethical aquaculture practices will be assessed critically.				
Programme module type:	Compulsory for Postgraduate Certificate in Sustainable Aquaculture (Invertebrates). Either BL5803 or (BL5808 and BL5809) is compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Anti-requisite(s):	BL5803			
Learning and teaching methods and delivery:	4 hours of lectures each week for 5 weeks, and 3 hours of tutorials each week for 2 weeks.			
Assessment pattern:	Coursework = 40%, 2-hour Examination = 60%			
Module Co-ordinator:	Dr N Hazon			

BL5809 Health and Disease - Vertebrates				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of the factors that influence disease processes in cultured invertebrate species including viral, bacterial, parasitic and non-infectious disease. The wide range of specific causes of disease and pathology in farmed species will be discussed and the importance of operations and management on the development and impact of disease in optimising fish welfare and developing sustainable and ethical aquaculture practices will be assessed critically.				
Programme module type:	Compulsory for Postgraduate Certificate in Sustainable Aquaculture (Vertebrates). Either BL5803 or (BL5808 and BL5809) is compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Anti-requisite(s):	BL5803			
Learning and teaching methods and delivery:	4 hours of lectures each week for 5 weeks, and 3 hours of tutorials each week for 2 weeks			
Assessment pattern:	Coursework = 40%, 2-hour Examination = 60%			
Module Co-ordinator:	Dr N Hazon			

BL5821 Breeding and Genetics				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of selective breeding programmes and modern genetic techniques applied in aquaculture practices. Scientific and ethical issues raised by the application of genetic engineering will be examined with the context of developing sustainable aquaculture.				
Programme module type:	Optional for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Learning and teaching methods and delivery:	1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr S Wadsworth			

BL5822 Advanced Welfare and Ethics				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of the welfare and ethical issues raised by current aquaculture practices. Animal welfare is rapidly developing as a major ethical issue within all areas of food production including aquaculture. Future development of sustainable aquaculture must incorporate ethical practices, optimising animal welfare and as a consequence improving the final product.				
Programme module type:	Optional for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Learning and teaching methods and delivery:	1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr P Southgate			

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BL5823 Recirculation Aquaculture Systems				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of the use of recirculating aquaculture systems in modern aquaculture practices. Recirculating aquaculture systems potentially provide environmentally sustainable aquaculture practices but must be assessed and viewed within the context of ethical, financial and social components of sustainability.				
Programme module type:	Optional for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Learning and teaching methods and delivery:	1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr N Hazon			

BL5824 Ornamental and Aquaria Production				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of animals produced by the ornamental and aquaria section of the aquaculture business. This sector of the aquaculture business has specific issues with relation to establishing sustainable aquaculture practices. In particular, the sustainability and ethical issues with reference to both captive breeding systems and wild caught fish supply will be examined and assessed for different trade sectors.				
Programme module type:	Optional for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Learning and teaching methods and delivery:	1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr P Southgate			

BL5825 Larval Rearing				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance Learning
Planned timetable:	To be arranged.			
This module provides advanced knowledge of the larval production techniques used in the aquaculture business. Larval production is often the rate limited step in development of new aquaculture species and presents particular ethical and sustainability issues with regard to current production techniques.				
Programme module type:	Optional for Sustainable Aquaculture Taught Postgraduate Diploma and M.Sc. Programmes			
Learning and teaching methods and delivery:	1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr S Wadsworth			

BL5899 Sustainable Aquaculture Research Dissertation				
SCOTCAT Credits:	60	SCQF Level 11	Semester:	Whole Year
Planned timetable:	To be arranged.			
The research dissertation will involve the study of a defined problem within the field of Sustainable Aquaculture. Students will be required to collate and analyse data and to discuss their results in the light of existing literature. In some cases, projects might also involve the design of experiments or the gathering of data. Each project will be written up in the form of a thesis.				
Programme module type:	Compulsory for Postgraduate M.Sc. in Sustainable Aquaculture			
Learning and teaching methods and delivery:	Individual supervision			
Assessment pattern:	Dissertation of up to 15,000 words = 100%			
Module Co-ordinator:	Dr N Hazon			

ID5011 Geographic Information Systems for Environmental Management				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
This module provides an introduction to Geographic Information systems and their use in environmental problem solving. The module will be taught through a series of lectures, tutorials, laboratory classes and individual projects. The module will be assessed through class exercises and the final, short individual project. Students will be introduced to methods of acquiring, storing, analysing and displaying (2D and 3D) spatial digital data using the ArcGIS data package. An introduction to data manipulation and statistical techniques on a variety of environmental examples will be given. The module is taught within the School of Geography & Geosciences but incorporates datasets and analysis techniques used in earth and environmental science, biology, archaeology, and mathematics.				
Programme module type:	Optional for Ecosystem-Based Management of Marine Systems, Environmental Biology, Mathematics, Statistics, Economics, Management and Environmental History Taught Postgraduate Programmes.			
Pre-requisite(s):	A basic ability in computer skills (Basic word processing, spread sheet analysis)			
Anti-requisite(s):	GE5005, ID5010, ID5012			
Learning and teaching methods and delivery:	Weekly contact: Lectures, practicals and occasional tutorials.			
Assessment pattern:	As used by St Andrews: Coursework = 50%, Short Project = 50%			
Module Co-ordinator:	Dr Richard Bates			

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ID5012 Advanced Geographic Information Systems				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
<p>This module provides an advanced training in Geographic Information Systems (GIS) and their use in environmental problem solving. The module will be taught through a series of lectures, tutorials, laboratory classes with emphasis on a final independent GIS project. The module will begin with an introduction to data storage and manipulation, basic analysis of 2D and 3D spatial digital data and methods of display and will conclude with database design and more advanced data analysis using ArcGIS. Assessment will be based on the class exercises and the final project. The module is taught within the School of Geography & Geosciences but incorporates datasets and analysis techniques used in earth science, biology, economics and management and mathematics.</p>				
Programme module type:	Optional for M.Res. in Environmental Biology Taught Postgraduate Programmes.			
Learning and teaching methods and delivery:	Weekly contact: Lectures, practicals and occasional tutorials.			
Assessment pattern:	As used by St Andrews: Coursework = 40%, Individual Project = 60%			

MT5751 Estimating Animal Abundance				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	2
Planned timetable:	2.00 pm			
<p>The module will introduce students to the main types of survey method for wildlife populations. It will cover simple methods in some detail and provide students with a conceptual framework for building understanding of more advanced methods. By the end of the course, students will be able to identify an appropriate assessment method for a given population, be able to design a simple survey to assess the population, and perform simple analyses of survey data. Students will get experience in using the methods via computer practical sessions involving design and analyses of surveys conducted by computer simulation.</p>				
Programme module type:	<p>Optional for all Postgraduate Taught Programmes within the School of Mathematics & Statistics.</p> <p>Optional for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences and M.Res. in Marine Mammal Science Postgraduate Taught Programmes.</p>			
Learning and teaching methods and delivery:	Weekly contact: 7 hours of lectures and 5 hours of practical classes per week for 2 weeks.			
Assessment pattern:	As used by St Andrews: Coursework = 33%, Written Examination = 67%			
Module Co-ordinator:	Dr D L Borchers			
Lecturer(s)/Tutor(s):	Dr D L Borchers			

MT5753 Statistical Modelling				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	1
Planned timetable:	2.00 pm			
<p>This module will introduce the main ideas of linear and generalised linear statistical modelling and will provide training in applied statistical modelling. The module structure is as follows: what statistical models are and what they are for; distributions, point and interval estimation and hypothesis testing; simple linear regression models for normal data; multiple regression; multiple regression with qualitative explanatory variables; less linear models for non-normal data; generalized linear models. Lectures will be built around the book 'An Introduction to Statistical Modelling' (Krzanowski, 1998), which closely matches what we believe to be an ideal course structure.</p>				
Programme module type:	<p>Compulsory for Applied Statistics and Datamining Taught Postgraduate Programme.</p> <p>Compulsory for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences and M.Res. in Marine Mammal Science Postgraduate Taught Programmes.</p> <p>Optional for M.Res. in Ecosystem-Based Management of Marine Systems</p> <p>Optional for Statistics Taught Postgraduate Programme.</p>			
Required for:	MT5755, MT5757			
Learning and teaching methods and delivery:	Weekly contact: 6 hours lectures, 1.5 hours tutorials and 6 hours practicals each week for 4 weeks.			
Assessment pattern:	As used by St Andrews: Coursework = 50%, Written Examination = 50%			
Module Co-ordinator:	Dr M L MacKenzie			
Lecturer(s)/Tutor(s):	Dr M L MacKenzie, Dr P Wilson			

MT5754 Mini Project 1				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
<p>This module is an alternative to students who have already studied BL5016 (Modelling Ecological Dynamics) as part of their undergraduate training or have gained an equivalent level of training out-with St Andrews. The module will allow the student to apply the skills and knowledge previously acquired in a short mini project appropriate to the taught module. The mini project will be designed to have the same workload as the equivalent taught module.</p>				
Programme module type:	Optional for M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.			
Pre-requisite(s):	BL5016 or the equivalent course outwith St Andrews			
Learning and teaching methods and delivery:	Weekly contact: Individual projects planned with the appropriate Module Co-ordinator and meetings arranged as required.			
Assessment pattern:	As used by St Andrews: Coursework = 100%			

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MT5755 Mini Project 2				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
<p>This module is an alternative to students who have already studied MT5753 (Statistical Modelling) as part of their undergraduate training or have gained an equivalent level of training outwith St Andrews. The module will allow the student to apply the skills and knowledge previously acquired in a short mini project appropriate to the taught module. The mini project will be designed to have the same workload as the equivalent taught module.</p>				
Programme module type:	Optional for M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.			
Pre-requisite(s):	MT5753 or the equivalent course outwith St Andrews			
Learning and teaching methods and delivery:	Weekly contact: Individual projects planned with the appropriate Module Co-ordinator and meetings arranged as required.			
Assessment pattern:	As used by St Andrews: Coursework = 100%			