

School of Biology

Head of School

Professor M White

Taught Programmes

Postgraduate Certificate:

Sustainable Aquaculture (Vertebrates)

Sustainable Aquaculture (Invertebrates)

Postgraduate Diploma:

Sustainable Aquaculture

MSc:

Ecosystem-Based Management of Marine Systems

Marine Mammal Science

Sustainable Aquaculture

Programme Requirements

Ecosystem-Based Management of Marine Systems

Taught Element:

20 credits: BL5303

at least 60 credits: BL5111, BL5113, BL5301, BL5304, BL5321, ID5011

at least 35 credits: BL5302, BL5322, BL5323, BL5324, (BL5124 or BL4249)

MSc:

120 credits from the Taught Element, plus BL5399 (60-credit Research Project module)

Marine Mammal Science

Taught Element:

75 credits from compulsory modules: BL5104, BL5111, BL5113, BL5201, BL5202

and

45 credits from optional modules: BL5103, BL5121, BL5122, BL5124, BL5125, MT5751

MSc:

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)

MSc:

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.

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Biology (BL) Modules

BL4249 Scientific Diving				
SCOTCAT Credits:	15	SCQF Level 10	Semester:	2
Planned timetable:	Full Time 2-3 weeks in March/April			
<p>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.</p>				
Programme module type:	Optional for MSc in Ecosystem-Based Management of Marine Systems			
Pre-requisite(s):	Permission required, PADI Advanced Open Water Diver or BSAC Sports Diver (or equivalent)			
Learning and teaching methods and delivery:	Weekly contact: 8 hours per day for 2 weeks.			
Assessment pattern:	As used by St Andrews: Coursework = 100%			
Module Co-ordinator:	Dr C Peddie			
Lecturer(s)/Tutor(s):	Dr C Peddie, Dr S Whiten			

BL5103 Population Biology of Marine Mammals				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
<p>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.</p>				
Programme module type:	Optional for MSc in Marine Mammal Science Postgraduate Programme.			
Learning and teaching methods and delivery:	Weekly contact: 4 lectures, 1 seminar and 1 practical class each week for 3 weeks.			
Assessment pattern:	1.5-hour Written Examination = 50%, Coursework = 50%			
Module Co-ordinator:	Dr S Smout			

BL5104 Conservation and Management of Marine Mammals				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	2
Planned timetable:	9.00 am (weeks 8 - 11)			
<p>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.</p>				
Programme module type:	Compulsory for MSc in Marine Mammal Science Postgraduate Programme.			
Learning and teaching methods and delivery:	Weekly contact: 3 lectures and 2 seminars each week for 4 weeks.			
Assessment pattern:	1.5-hour Written Examination = 50%, Coursework = 50%			
Module Co-ordinator:	Dr S Heinrich			

BL5111 Quantitative Methods for Biology				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
<p>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.</p>				
Programme module type:	Compulsory for MSc in Marine Mammal Science Postgraduate Programme. Optional for MSc in Ecosystem-based Management of Marine System Postgraduate Programme.s			
Anti-requisite(s):	BL5021			
Learning and teaching methods and delivery:	Weekly contact: To be arranged, 3 weeks long.			
Assessment pattern:	1.5-hour Written Examination = 50%, Coursework = 50%			
Module Co-ordinator:	Dr S Smout			

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BL5113 Statistical Modelling of Biological Data				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged. 4 weeks long.			
Statistical modelling is an indispensable tool for the analysis of scientific data. This advanced level module will introduce methods for fitting models to biological data, mainly using R software. Approaches will include multiple regression, GLMs, and GAMs. We will consider some of the difficulties that can occur in modelling biological data sets e.g. temporal autocorrelation, and will look at ways to check and test models. We will consider approaches to model selection. The course will also cover multivariate techniques such as cluster analysis.				
Programme module type:	Compulsory for MSc in Marine Mammal Science Postgraduate Programme. Optional for MSc in Ecosystem-based Management of Marine Systems Postgraduate Programme.			
Co-requisite(s):	BL5111	Anti-requisite(s):	MT5753	
Learning and teaching methods and delivery:	Weekly contact: 10 x 1-hour lectures (x 4 weeks), 2 x 1-hour seminars (x 4 weeks), 15 x 3-hour practicals (x 4 weeks).			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr S Smout			
Lecturer(s)/Tutor(s):	Dr S Smout, Dr L Rendell, Prof S Hubbard			

BL5121 Current Issues in Marine Mammal Behaviour				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged. (3 weeks)			
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 MSc in Marine Mammal Science Postgraduate Programme.			
Pre-requisite(s):	BL5201			
Learning and teaching methods and delivery:	Weekly contact: 1 lecture and 9 seminars spread over 3 weeks.			
Assessment pattern:	1.5-hour Written Examination = 50%, Coursework = 50%			
Module Co-ordinator:	Dr V Janik			

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BL5122 Current Issues in Biologging				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	2
Planned timetable:	9.00 am (4 weeks)			
<p>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.</p>				
Programme module type:	Optional for MSc in Marine Mammal Science Postgraduate Programme.			
Pre-requisite(s):	BL5201			
Learning and teaching methods and delivery:	Weekly contact: 3 lectures, 1 seminar and 1 practical class each week for 3 weeks.			
Assessment pattern:	1.5-hour Written Examination = 50%, Coursework = 50%			
Module Co-ordinator:	Dr S Hooker			

BL5124 Predator Ecology in Polar Ecosystems - a Field Course in Antarctica				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	2
Planned timetable:	7 weeks (including 3 weeks of field course in Antarctica)			
<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 MSc in Ecosystem-Based Management of Marine Systems and in Marine Mammal Science Postgraduate Programmes.			
Pre-requisite(s):	Undergraduate degree in relevant Biological disciplines and/or admittance to St Andrews MSc Programmes, Medical certificate documenting fit for travel to remote Antarctica			
Anti-requisite(s):	BL4301			
Learning and teaching methods and delivery:	Weekly contact: Lectures, seminars and practicals for 2 weeks			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr S Heinrich			

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BL5125 Advanced Bioacoustics for Marine Mammal Science				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
<p>Bioacoustics is an important topic in marine mammal science, because of the use the animals themselves make of sound, because it is often the most practical way to detect their presence, and because of the impacts anthropogenic sounds can have on acoustically sensitive species. This course provides an advanced survey of current topics, from understanding the physics of sound and how it is measured and analysed, through using sound to detect and monitor marine mammal presence, to the assessment and mitigation of anthropogenic noise impacts. There will be a strong emphasis on digital analysis and practical exercises designed to introduce students to the range of techniques and tools currently used in the field.</p>				
Programme module type:	Optional for MSc in Marine Mammal Science Postgraduate Programme.			
Pre-requisite(s):	Students should have had some background in either marine mammal biology or physics, and should have studied some kind of mathematics to SCQF Level 7 or equivalent.			
Learning and teaching methods and delivery:	Weekly contact: 3 hours of lectures, 12 hours of practical classes, 3 tutorials and 4 hours of fieldwork over a 4 week period.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr L Rendell			
Lecturer(s)/Tutor(s):	Dr L Rendell, Dr D Gillespie, Dr V Janik, Dr M Johnson, Dr P Tyack			

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 MSc in Marine Mammal Science Postgraduate Programme.			
Learning and teaching methods and delivery:	Weekly contact: To be arranged.			
Assessment pattern:	Research report or Thesis of up to 15,000 words (excluding bibliography) = 70 %, Research proposal = 20%, Poster presentation = 10%			
Module Co-ordinator:	Dr S Heinrich			

BL5201 Biology of Marine Mammals				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
<p>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.</p>				
Programme module type:	Compulsory for MSc in Marine Mammal Science Postgraduate Programme.			
Pre-requisite(s):	Undergraduate courses in behaviour, ecology, physiology, zoology or marine science			
Required for:	BL5121, BL5122			
Learning and teaching methods and delivery:	Weekly contact: 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.			
<p>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.</p>				
Programme module type:	Compulsory for MSc in Marine Mammal Science Postgraduate Programme.			
Learning and teaching methods and delivery:	Weekly contact: 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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BL5302 Cold Water Marine Systems				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
<p>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.</p>				
Programme module type:	Optional for MSc in Ecosystem-Based Management of Marine Systems Postgraduate Programme.			
Learning and teaching methods and delivery:	Weekly contact: 20 lectures, and 1 practical over 3 weeks			
Assessment pattern:	3-hour Written Examination = 50%, Coursework = 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.			
<p>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.</p>				
Programme module type:	Compulsory for MSc in Ecosystem-Based Management of Marine Systems Postgraduate Programme.			
Learning and teaching methods and delivery:	Weekly contact: 7 lectures, 2 tutorials and 5 practicals in total.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr T Nickell (SAMS)			

BL5304 Ecosystem-based Management of Marine Systems				
SCOTCAT Credits:	15	SCQF Level 11	Semester:	1
Planned timetable:	To be arranged.			
This module will introduce the concept of 'Ecosystem-based management', exploring its development from more simplistic, single-species approaches. Students will make case-studies in a workshop environment of iconic, managed ecosystems including the Southern Ocean and Australia's Great Barrier Reef.				
Programme module type:	Optional for MSc in Ecosystem-based Management of Marine Systems Postgraduate Programme.			
Learning and teaching methods and delivery:	Weekly contact: Lectures and Seminars.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Prof A Brierley			
Lecturer(s)/Tutor(s):	Prof A Brierley			

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 MSc in Ecosystem-Based Management of Marine Systems Postgraduate Programme.			
Anti-requisite(s):	BL5011			
Learning and teaching methods and delivery:	Weekly contact: 14 lectures and 2 practicals over 3 weeks.			
Assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module Co-ordinator:	Dr R Aspden			

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BL5322 Marine Management, Policy and Planning				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
<p>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.</p>				
Programme module type:	Optional for MSc in Ecosystem-Based Management of Marine Systems Postgraduate Programme.			
Learning and teaching methods and delivery:	Weekly contact: 13 lectures, 2 x half-day practical sessions and a 1-day workshop			
Assessment pattern:	3-hour Written Examination = 50%, Coursework = 50%			
Module Co-ordinator:	Dr C Fox (SAMS)			

BL5323 Advanced Modelling				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	2
Planned timetable:	To be arranged.			
<p>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.</p>				
Programme module type:	Optional for MSc in Ecosystem-Based Management of Marine Systems Postgraduate Programme.			
Learning and teaching methods and delivery:	Weekly contact: 12 lectures and 7 x 3-hour practical classes over 3 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr S Heymans (SAMS)			

BL5399 Ecosystem-Based Management of Marine Resources 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 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.</p>				
Programme module type:	Compulsory for MSc in Ecosystem-Based Management of Marine Systems Postgraduate Programme.			
Learning and teaching methods and delivery:	Weekly contact: To be arranged.			
Assessment pattern:	Research report or Thesis of up to 15,000 words (excluding bibliography) = 100%			
Module Co-ordinator:	Dr S Smout			

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BL4801 Aquaculture and Fisheries				
SCOTCAT Credits:	10	SCQF Level 10	Semester:	Distance
Planned timetable:	To be arranged.			
<p>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.</p>				
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:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	Dr N Hazon			

BL4802 Biology for Aquaculture				
SCOTCAT Credits:	20	SCQF Level 10	Semester:	Distance
Planned timetable:	To be arranged.			
<p>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.</p>				
Programme module type:	Either BL4802 or (BL4803 and BL4804) is compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and MSc 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:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	Dr N Hazon			

BL4803 Biology for Aquaculture - Invertebrates				
SCOTCAT Credits:	10	SCQF Level 10	Semester:	Distance
Planned timetable:	To be arranged.			
<p>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.</p>				
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 MSc 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:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	Dr N Hazon			

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BL4804 Biology for Aquaculture - Vertebrates				
SCOTCAT Credits:	10	SCQF Level 10	Semester:	Distance
Planned timetable:	To be arranged.			
This module provides an understanding of the fundamental biology of vertebrate 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 (vertebrates) Either BL4802 or (BL4803 and BL4804) is compulsory for Sustainable Aquaculture Taught Postgraduate Diploma and MSc 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:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	Dr N Hazon			

BL5801 Nutrition for Aquaculture				
SCOTCAT Credits:	20	SCQF Level 11	Semester:	Distance
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 Postgraduate Diploma and MSc Programmes.			
Anti-requisite(s):	BL5806 and BL5807			
Learning and teaching methods and delivery:	Weekly contact: 1 lecture and 1 tutorial each week for 10 weeks.			
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%			
Module Co-ordinator:	Dr N Hazon			
Lecturer(s)/Tutor(s):	Dr S Wadsworth			

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BL5802 Management, Husbandry and Sustainability

SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance
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 Postgraduate Diploma and MSc Programmes. Optional for both Sustainable Aquaculture Postgraduate Certificates.			
Learning and teaching methods and delivery:	Weekly contact: 1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%			
Module Co-ordinator:	Dr N Hazon			
Lecturer(s)/Tutor(s):	Dr P Southgate			

BL5803 Health and Disease

SCOTCAT Credits:	20	SCQF Level 11	Semester:	Distance
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 Postgraduate Diploma and MSc Programmes.			
Anti-requisite(s):	BL5808 and BL5809			
Learning and teaching methods and delivery:	Weekly contact: 1 lecture and 1 tutorial each week for 10 weeks.			
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%			
Module Co-ordinator:	Dr N Hazon			
Lecturer(s)/Tutor(s):	Dr P Southgate			

BL5804 Markets, Products, Processing and Food Safety

SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance
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 Postgraduate Diploma and MSc Programmes. Optional for both Sustainable Aquaculture Postgraduate Certificates.			
Learning and teaching methods and delivery:	Weekly contact: 1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%			
Module Co-ordinator:	Dr N Hazon			
Lecturer(s)/Tutor(s):	Dr S Wadsworth			

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BL5805 Local and Global Impacts of Aquaculture				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance
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 Postgraduate Diploma and MSc Programmes. Optional for both Sustainable Aquaculture Postgraduate Certificates.			
Learning and teaching methods and delivery:	Weekly contact: 1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%			
Module Co-ordinator:	Dr N Hazon			
Lecturer(s)/Tutor(s):	Dr J A David			

BL5806 Nutrition - Invertebrates				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance
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 Postgraduate Diploma and MSc Programmes			
Anti-requisite(s):	BL5801			
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:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	Dr N Hazon			

BL5807 Nutrition - Vertebrates				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance
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 Postgraduate Diploma and MSc Programmes			
Anti-requisite(s):	BL5801			
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:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	Dr N Hazon			

BL5808 Health and Disease - Invertebrates				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance
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 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 Postgraduate Diploma and MSc Programmes			
Anti-requisite(s):	BL5803			
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:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	Dr N Hazon			

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BL5809 Health and Disease - Vertebrates				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance
Planned timetable:	To be arranged.			
This module provides advanced knowledge of the factors that influence disease processes in cultured fish 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 Postgraduate Diploma and MSc Programmes			
Anti-requisite(s):	BL5803			
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:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	Dr N Hazon			

BL5821 Breeding and Genetics				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance
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 Postgraduate Diploma and MSc Programmes.			
Learning and teaching methods and delivery:	Weekly contact: 1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr N Hazon			

BL5822 Advanced Welfare and Ethics				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance
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 Postgraduate Diploma and MSc Programmes.			
Learning and teaching methods and delivery:	Weekly contact: 1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr N Hazon			
Lecturer(s)/Tutor(s):	Dr J A David			

BL5823 Recirculation Aquaculture Systems				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance
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 Postgraduate Diploma and MSc Programmes.			
Learning and teaching methods and delivery:	Weekly contact: 1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr N Hazon			
Lecturer(s)/Tutor(s):	Dr J A David			

BL5824 Ornamental and Aquaria Production				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance
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 Postgraduate Diploma and MSc Programmes.			
Learning and teaching methods and delivery:	Weekly contact: 1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr N Hazon			

BL5825 Larval Rearing				
SCOTCAT Credits:	10	SCQF Level 11	Semester:	Distance
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 Postgraduate Diploma and MSc Programmes.			
Learning and teaching methods and delivery:	Weekly contact: 1 lecture and 1 tutorial each week for 5 weeks.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	Dr N Hazon			

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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 MSc in Sustainable Aquaculture.			
Learning and teaching methods and delivery:	Weekly contact: Individual supervision			
Assessment pattern:	Dissertation of up to 15,000 words = 100%			
Module Co-ordinator:	Dr N Hazon			
Lecturer(s)/Tutor(s):				