Master of Science Marine Mammal Science

Programme Requirements

Marine Mammal Science - MSc

BL5104 (15 credits) **and** BL5111 (10 credits) **and** BL5113 (20 credits) **and** BL5210 (30 credits) **and** BL5199 (60 credits) **and**
45 credits from Module List: BL5103, BL5121 - BL5122, BL5124 - BL5125, MT5751

Compulsory modules:

BL5104 Conservation and Management of Marine Mammals

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	Weeks 8 - 11			
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 MSc in Marine Mammal Science Postgraduate Programme.			
Learning and teaching methods and delivery:	**Weekly contact**: 3 lectures and 1 seminar each week for 4 weeks, plus 1 workshop in total.			
Assessment pattern:	1.5-hour Written Examination = 50%, Coursework = 50%			
Module coordinator:	Dr S Heinrich			
Module teaching staff:	Team taught			

BL5111 Quantitative Methods for Biology

SCOTCAT Credits:	10	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged. (Weeks 1 - 7)			
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 MSc in Marine Mammal Science and for MSc in Ecosystem-based Management of Marine System Postgraduate Programmes			
Anti-requisite(s):	BL5021			
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures (x 4 weeks), 1 tutorial (x 4 weeks), assessed lab (x 2 weeks), non-assessed lab (x 3 weeks)			
Assessment pattern:	Coursework = 100%			
Module coordinator:	Dr S Smout			
Module teaching staff:	Team taught			

BL5113 Statistical Modelling of Biological Data

SCOTCAT Credits:	20	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged. (Weeks 8 - 11)			
Statistical modelling is an indispensible 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 and for MSc in Ecosystem-based Management of Marine Systems Postgraduate Programmes.			
Co-requisite(s):	BL5111		**Anti-requisite(s):**	MT5753
Learning and teaching methods and delivery:	**Weekly contact**: 4 x 1-hour lectures and 4 x 3-hour labs and 1 x 2-hour seminar. Four weeks in total.			
Assessment pattern:	Coursework = 100%			
Module coordinator:	Dr S Smout			
Module teaching staff:	Team taught			

BL5210 Principles of Marine Mammal Biology

SCOTCAT Credits:	30	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			
This module is core to the MSc Marine Mammal Science and covers key concepts of marine mammal biology. The module introduces the zoogeography of marine mammals and the morphological, physiological and behavioural adaptations that have enabled this diverse group to successfully colonise all of the world's oceans and some freshwater systems. Lectures will focus on topical issues illustrating and contrasting some of the strategies shown by different marine mammal groups and the research techniques currently employed to study the diverse aspects of marine mammal biology and conservation. Student-led seminars and practical classes will complement the lecture series and will introduce some of the applied skills needed to investigate marine mammal ecology and behaviour, including the use spatial and acoustic tools.				
Programme module type:	Compulsory for MSc in Marine Mammal Science Postgraduate Programme			
Learning and teaching methods and delivery:	**Weekly contact**: 10 hours of lectures (x 5 weeks), 2 hours of seminars (x 5 weeks) and 4 hours of practicals (x 5 weeks)			
Assessment pattern:	3-hour Written Examination = 30%, Coursework = 70%			
Module coordinator:	Dr S Heinrich			
Module teaching staff:	Team taught			

BL5199 Marine Mammal Science 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 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. Students are tasked with developing a research proposal on their project topic. Each project will then be written up in the form of a thesis and presented as a poster during the end of year MSc student conference.				
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 coordinator:	Dr S Heinrich			

Optional modules:

BL5103 Population Biology of Marine Mammals				
SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	Weeks 5 - 7			
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:	Optional for MSc in Marine Mammal Science Postgraduate Programme.			
Learning and teaching methods and delivery:	**Weekly contact**: 4 lectures (x 3 weeks), seminar (x 2 weeks), tutorial (x 1 week), lab (x 3 weeks)			
Assessment pattern:	Coursework = 100%			
Module coordinator:	Dr S Smout			
Module teaching staff:	Team taught			

BL5121 Current Issues in Marine Mammal Behaviour				
SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	Weeks 5 - 7			
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-requiste(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 coordinator:	Dr V Janik			

BL5122 Current Issues in Biologging

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	Weeks 1 - 4			

This module will present an introduction to 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 challenges associated with tag design in terms of how data is stored and transmitted, and problems associated with data analysis and data display. Seminars will discuss some of the ethical and conservation issues that biologging science raises. Two practicals and the continuous assessment for this module introduce students to the difficulties collecting biologging data (using heart-rate dataloggers on themselves) and look at aspects of experimental design and how to write results in a publishable format. A further two practicals explore some of the methods used to view and analyse movement and diving data.

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 - 2 lectures, 1 seminar and 1 practical class each week for 4 weeks.
Assessment pattern:	Coursework = 100%
Module coordinator:	Dr S Hooker
Module teaching staff:	Team taught

BL5124 Predator Ecology in Polar Ecosystems - a Field Course in Antarctica

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	Whole Year
Planned timetable:	lectures in S1, field course in S2 including 3 weeks in southern Argentina and Antarctica)			

This module offers 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 vessel-based expedition to Antarctica during the austral summer and will also explore southern Argentina. 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, workshops, 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 manuscript for submission to a journal. Participating students will need to cover all logistic expenses via payment of a substantial expedition fee.

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**: 8 x 1.5-hour lectures in S1 and several tutorials plus full day field practicals during the expedition.
Assessment pattern:	Coursework = 100%
Additional information from School:	Students interested in this module should contact the module co-ordinator before pre-advising.
Module coordinator:	Dr S Heinrich
Module teaching staff:	Dr S Heinrich & Dr L Boheme

BL5125 Advanced Bioacoustics for Marine Mammal Science

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	Weeks 1 - 4			
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.				
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**: 8 lectures and 8 practical classes, 3 tutorials and 4 hours of fieldwork over a 4 week period.			
Assessment pattern:	Coursework = 100%			
Module coordinator:	Dr L Rendell			
Module teaching staff:	Team taught			