University of the Highlands and Islands
Oilthigh na Gàidhealtachd agus nan Eilean

SCOTTISH ASSOCIATION for MARINE SCIENCE

BSc (Hons) Marine Science

Course Handbook

Welcome to the University of the Highlands and Islands (UHI) and the Scottish Association for Marine Science (SAMS) BSc (Hons) Marine Science Course Handbook. The aim of this handbook is to give you the information you will need to help you throughout your time at the laboratory. We hope that you will enjoy the challenge and companionship of studying for a BSc (Hons) in Marine science at the Scottish Marine Institute.

Student Exit Level Profile

A student exit level profile (below) as been developed based on course content, graduate key skills and subject benchmarks. This matrix is of use to staff, students and potential employers.

Student exit level profile

	Level H1	Level H2	Level H3	Level H4
Intellectual	Be able to recognise subject specific theories and concepts	Be able to summarise and analyse information in a critical manner Recognise moral and ethical issues within the subject	Be able to synthesise information to test hypotheses Be able to act on moral and ethical issues within the subject in a professional manner	Be able to apply knowledge and understanding to address unfamiliar problems Be able to synthesise diverse information to formulate and test hypotheses
Practical	Collect and record data using appropriate techniques Reference work in an appropriate manner Undertake field and laboratory investigations in a safe manner	Be able to plan and conduct scientific investigations	Be able to use secondary data to inform the planning and conduct of scientific investigations	Be able to identify problems and devise practical solutions
Communication	Be able to receive and respond to a variety of information	Communicate to a variety of audiences by a number of means	Be able to analyse the communication of ones self and ones peers	Be able to produce well structured written reports and confidently

	sources Communicate in written, verbal and graphical forms			present material in an oral form
Numeracy & IT	Be able to use the internet critically as a means of communication & information Be aware of issues of sample selection, precision and uncertainty in field and laboratory data collection and analysis	Be able to solve problems using computer and non computer based techniques including mathematical models	Prepare, process and present data using both quantitative and qualitative techniques	Be able to use numerical and IT skills and predictive modelling to interpret data sets that are not amenable to simple observation.
Interpersonal	Be able to work individually and in a group	Be able to recognise and respect the views and opinions of other team members	Be able to evaluate performance as an individual and team member	Be able to identify individual and collective goals and responsibilities and perform in a manner appropriate to these
Self management	Have an adaptable and flexible approach to study and work	Be able to organize ones time and resources	Be able to identify and work towards targets for ones own career development	Be able to work independently

What do our students go on to do?

SAMS students leave for a variety of different careers in the marine science sector, both in the Highlands and elsewhere. In fact almost 60% of our students go in to research either in a career or in postgraduate education, both at SAMS and elsewhere. The fact that most of our graduates have remained within the marine science sector is testament to the success of our degree.

Course Structure, Content & Tutoring

Applicants to the course often have a range of academic qualifications or come from different experiential and professional backgrounds. The modules delivered at level 1 reflect both the background of students likely to enrol on the course so please don't worry – whether you are a school leaver or a mature student, the modules in year 1 will have you covered! These modules also take account of the disparity between Scottish and English qualifications and the underpinning science knowledge necessary for successful study at level 2.
Students will take 8 modules per year (4 per semester) with teaching being a mixture of lectures, tutorials, lab classes and field work. A typical module consists of 150 hours which is around 3 to 4 hours per module per week for which students are expected to attend SAMS.

LEVEL H1
The academic aim of this level is to provide the student with a broad understanding of science and to begin his/her training in the scientific method, using such areas of science as will be encountered in the marine context as the course progresses. The students are introduced to the marine nature of the degree *via* the module "Introducing Marine Science" and the "Marine Field Course 1".

All modules at Level H1 are mandatory: this ensures that all elements of an essential scientific background are adequately covered by all students. This is necessary because, even for those candidates with a strong science background in secondary education, many of the specific topics which are necessary before attempting H2 are inadequately covered in S and H grade syllabi.

While level H1 concentrates on basic science this is delivered in a marine context to best prepare students for higher level study and to maintain their enthusiasm for their chosen field of study.

At H1 level an extra module in Basic Mathematics is offered to students on a voluntary basis. This module operates in semester 1 in tutorial style with no formal assessments or examinations. It is intended to for those students who wish extra mathematics support prior to undertaking the full Mathematics and Statistics module in semester 2.

Status	*Ref.*	*Title*	*Credit value*	*Module leader*
Core	UC107147	**Marine Field Course** A practical introduction to the field aspects of Marine Science. Students will perform practical tasks in the field as individuals and members of small work groups. The interdisciplinary nature of Marine science will be emphasised.	15	Mr Colin Griffiths

Core	UG307152	**Mathematics and Statistics for Science** Covering a wide range of practical mathematics tasks this module will enable the student to conduct calculations and to analyse and discuss data acquired during practical and assignment work for the main marine curriculum areas.	15	Mr Colin Griffiths
Core	UG507139	**Information and Communication Technology** A comprehensive introduction to a wide range of techniques for communicating information to targeted audiences. It is taught in parallel with a number of science modules in order to embed the importance of communication within the overall ethos of the course.	15	Ms Linda Robb
Core	UF707148	**Marine Science, Introduction to (Mar Sci**) A module which complements MS1001 in introducing and consolidating the concept of Marine Science as an interdisciplinary and multidisciplinary subject. There are also close links with MS1003 in terms of shared assessments. Students are introduced to the biological, chemical, physical and geological processes in the sea and the exploitation of the seas' resources. This module takes a broad look at Marine Science and introduces students to areas that will be studied in depth at subsequent levels.	15	Dr Lois Calder
Core	UC107208	**Principles of Biology** Developing the students' knowledge of biology from fundamental principles and concepts to a level which enables them to handle the different areas, which are introduced at Level H2. This module will ensure that disparities in student background are reduced prior to Level H2 study. A significant feature will be the wide range of biological topics handled here.	15	Ms Shona Magill
Core	UF307180	**Principles of Physics (Mar Sci)** Developing the students' knowledge of physics from fundamental principles and concepts to a level, which enables them to handle the different areas, which are introduced in Level H2, and to use these principles to appreciate and explain	15	Dr Finlo Cottier

		environmental phenomena. This module will ensure that disparities in student background are reduced prior to Level H2 study.		
Core	UF107175	**Principles of Chemistry (Mar Sci)** Developing the students' knowledge of chemistry from fundamental principles and concepts to a level, which enables them to handle the different areas introduced in Level H2. Emphasis is placed on the importance of chemistry in the understanding of environmental processes. This module will ensure that disparities in student background are reduced prior to Level H2 study.	15	Dr Angela Hatton
Core	UF607179	**Principles of Geology (Mar Sci)** Developing the students' knowledge of geology from fundamental principles and concepts to a level, this enables them to handle the different areas, which are introduced in Level H2. This module will ensure that disparities in student background are reduced prior to Level H2 study.	15	Dr John Howe
Option		**Basic Mathematics** A tutorial based module with no formal assessment. This module revises the many aspects of basic mathematics prior to the mathematics and statistics module.	-	Dr Keith Davidson

Progression to level H2 will be by achievement of all modules either by the UHI assessment procedures or via Accreditation of Prior Learning (APL) or by credit transfer e.g. via an appropriate range of SQA unit credits or accredited courses from other institutions.

Exit qualification at SCQF level 7 with 120 SCOTCAT points achieved via level H1 modules:

Certificate of Higher Education - Fundamentals for Marine Science.

LEVEL H2

At H2 the curriculum becomes more explicitly marine and also introduces some of the more applied aspects of Marine Science that may provide potential career paths; the modules build on the basic science courses delivered at Level H1.

A Level H2 programme of study comprises 120 SCOTCAT points distributed over 8 modules:

Students must:

- complete the six mandatory core modules;
- select two modules from the Level H2 Marine Science options

Status	*Ref.*	*Title*	*Credit value*	*Module leader*
Core	UC108381	**Marine Skills Field Course** This practical module introduces the student to a wide range of practical marine skills to allow them to work safely and effectively as individuals and as members of a team. The skills learned will include seamanship, safe-working practices, and sampling techniques on boats and on contrasting shore types. Emphasis will be on the performance of the skills – students are required to plan and conduct a sampling expedition and analyse the data collected.	15	Mr Colin Griffiths
	UG308455	**Statistics and Experimental Design (Mar Sci)** Science is a method of study depending heavily on the analysis of experimental data and the testing of hypotheses. This module extends the principles and statistical methods learned in H1 and introduce the student to the design of experiments in order to generate the data necessary for hypothesis testing. The contexts for study of this module will be from the students' main curriculum areas, which will be used to provide 'real' environmental data.	15	Dr Tom Wilding

UC108377	**Marine Biology (Mar Sci)** Takes a broad look at Marine Biological topics extending many of those introduced in H1. Students will develop an understanding of (1) the interactions between marine organisms and their environment and of (2) the diversity of life forms and ecosystems in the oceans.	15	Dr Liz Cook
UF708408	**Physical Oceanography** Covering the physical properties of seawater, the processes which govern the circulation of water in the world ocean, the processes governing the mixing of bodies of seawater and the interaction between oceans and atmosphere this module sets physical oceanography as a discipline which aids understanding of global processes. This module extends the concepts introduced in H1.	15	Dr Andrew Dale
UF708318	**Chemical Oceanography** An examination of the composition of seawater in detail and the interactions between seawater and other components of marine environments. Analytical chemistry is used as a tool to investigate the nature of the oceans. This module extends the concepts introduced in H1.	15	Dr Henrik Stahl
UC108378	**Marine Geology** Allows the student to develop a knowledge and understanding of the changes which have occurred over geological time and have resulted in the form of the oceans as we know them today.	15	Dr John Howe

Options	UC708311	**Biochemistry and Molecular Biology (Mar Sci)** Building on topics introduced in H1 this module provides a comprehensive treatment of the intra-cellular processes of organisms and the mechanisms by which those processes are controlled and their relevance and application in Marine Science.	15	Dr Michelle Stanley
	UC108375	**Marine and Estuarine Systems** A broad treatment of a wide range of marine and estuarine ecosystems from all over the world but concentrating on the Scottish coast. Students will learn about the structure and functioning of ecosystems - extending some concepts introduced in H1 modules and introducing new areas of study.	15	Dr Bhavani Narayanaswamy
	UC108379	**Marine Resources (Mar Sci)** Takes a broad look at marine resources and human interaction with, and utilisation of, the sea and its natural products extending some comcepts introduced in H1 modules and introducing new areas of study.	15	Dr Tavis Potts

Exit qualification at SCQF level 8 with 120 SCOTCAT points achieved via level 2 modules:

Diploma of Higher Education - Foundations of Marine Science.

LEVEL H3
Modules at Level H3 complete the solid grounding in Marine Science that is the primary objective of the whole degree; there is an opportunity for students to continue the process of specialisation that they were able to begin at Level H2. Modules are divided into option sets. To maintain the breadth of their studies students must select modules from both sets A and B. This level is the true beginning of specialisation.

A Level H3 programme of study will comprise 120 SCOTCAT points distributed over 8 modules:
Students must:

- complete the mandatory project module
- select six modules from the Level H3 Marine Science options; in order to preserve the holistic nature of the programme students must select a minimum of two modules from both option sets A and B.
- select one further module:
  - ✓ This may be another option set A or B module
  - ✓ All students may choose a Level H2 option module (complying with SCQF regulations regarding mixed level study)

Status	*Ref.*	*Title*	*credit value*	*Module leader*
Core	UF609654	**Project (Mar Sci)** All students on the BSc Marine Science will complete a practical assignment through which they will develop independent research skills in a particular area of Marine Science.	15	Dr Tim O'Higgins
Options Set A	UF709501	**Fisheries Science** Examines the underlying science and technology, which relates to the managed utilisation of marine fish (finfish and shellfish). Social, political and economic issues of fisheries are dealt with, as are the environmental impacts of fishing related activities.	15	Dr Clive Fox
	UC109515	**Aquaculture** The history of marine aquaculture and the development of aquaculture technology and the use of new species as a subject of culture: sustainable development, physical, biological and economic constraints on aquaculture is also covered.	15	Dr Maeve Kelly

	UC109615	**Marine Zoology (Mar Sci)** An extension of module marine biology, enabling the student to develop a deeper understanding of the environmental and evolutionary significance of the adaptations of marine animals to a wide range of marine environments.	15	Dr Ben Wilson
	UC509619	**Microbial Ecology** A comprehensive examination of the role of micro-organisms in marine ecosystems and the techniques used in their study is given.	15	Dr Keith Davidson
	UC109609	**Marine Biotechnology (Mar Sci)** The principles of molecular biology are developed into the potential for using marine organisms as a source of materials for use in pharmaceuticals, vaccines, anti-foulants, dietary supplements and bio-fuels.	15	Dr David Green
	UC109713	**Marine Conservation** Students will gain sound knowledge of the fundamental principles of marine conservation in the context of sustainable development. Enables the student to gain an understanding of the tools available for mitigation of pressures on, management and conservation of, global marine ecosystems.	15	Dr Elanor Bell
Option Set B	UF709630	**Ocean Circulation and Climate** This module examines the close relationship between ocean circulation, atmospheric circulation and their joint effects upon the nature of global and regional climates.	15	Prof Toby Sherwin
	UC109614	**Marine Technology** An introduction to the student to the technologies which have been used in studying the oceans and in developing practical applications of ocean science.	15	Dr Keith Jackson

	UC109712	**Marine Biogeochemical Cycling** A focused examination of the mechanisms by which materials are cycled in the marine environment and the influences of natural and anthropogenic phenomena in the biogeochemical cycles and the consequent effects on the environment.	15	Dr Angela Hatton
	UF709677	**Sediment Processes** Developing an understanding and awareness of the role of marine sediments in the global cycling of matter and energy and in the development of the palaeorecord.	15	Dr Thom Nickell
	UC109613	**Marine Pollution** Enables the student to develop knowledge and understanding of the relationships between organisms, environments and contaminants in the environment, and the influence of environmental variables (e.g. season, climate, and hydrography) upon them.	15	Dr Robert Turnewitsch

Exit qualification at SCQF level 9 with 120 SCOTCAT points achieved via level 3 modules:

BSc in Marine Science.

LEVEL H4 (Honours)
Modules at Level H4 advance the knowledge gained within the ordinary degree and extend students abilities to put this knowledge into practice.

Core modules of an extended dissertation and case study provides the student with the opportunity to research areas of particular interest to themselves in some depth and to develop further critical and analytical skills.

Optional modules are offered in areas of current topical interest in Marine Science that are best supported by the strengths within SAMS, providing students with insight and an opportunity to explore the cutting edge of Marine Science and to advance any particular specialisations that they wish to pursue.

A Level H4 programme of study will comprise 120 SCOTCAT points distributed over 8 modules:

Students must:

- complete the mandatory double dissertation module;
- complete the mandatory case study module
- select three modules from the Level H4 Marine Science options

Also select either:

- a further one or two Level H4 option modules.

Or:

- one or two Level H3 option module (complying with SCQF regulations regarding mixed level study)*

* In accordance with the SCQF framework students may select up to two modules from Level H3 of the BSc Marine Science as electives. However, they must still achieve a minimum of 180 at levels 9 (H3) and 10 (H4) with at least 90 credits are at Level H4.

Modules at Level H4 advance the knowledge gained within the ordinary degree and extend students abilities to put this knowledge into practice.

Core modules of an extended dissertation and case study provides the student with the opportunity to research areas of particular interest to themselves in some depth and to develop further critical and analytical skills.

Optional modules are offered in areas of current topical interest in Marine Science that are best supported by the strengths within SAMS, providing students with insight and an opportunity to explore the cutting edge of Marine Science and to advance any particular specialisations that they wish to pursue.

Status	*Ref.*	*Title*	*credit value*	*Module leader*
Core	UF710724	**Dissertation (Mar Sci) (Double Module)** All students on the BSc Marine Science (Hons) will undertake a substantial piece of research in which they will demonstrate independent research skills and critical thought in a particular area of Marine Science.	30	Dr Adam Hughes
Core	UF710709	**Case Study (Mar Sci)** All students on the BSc Marine Science (Hons) will undertake a desk based case study of current topical or important issues. Analytical, presentation and teach working skills will be developed.	15	Dr Lois Calder
Options	UC110702	**Advanced Marine Technology** An advanced study of the underlying physics and practical applications of ocean observing systems and technologies.	15	Dr Keith Jackson
	UMSO104	**Behaviour & Biomechanics of Marine Animals** Developing an understanding of the mechanisms used by animals to find prey and to avoid capture by predators and how these are influenced by environment.	15	Dr Kim Last
	UC110718	**Defining The Marine Carbon Cycle** The development of a detailed understanding of the oceanic carbon cycle, to qualitatively assess the implications of its reactivity, and to critically evaluate the techniques used to quantify its dynamics from microscopic to global scales.	15	Prof Axel Miller
	UC110714	**Coastal and Shelf Sea Dynamics** Developing a dynamical understanding of the physical processes that dominate the fluid dynamics of coastal and shelf seas.	15	Dr Mark Inall
	UF710757	**Science Communication** An opportunity to develop the knowledge and skills to communicate science effectively and at an appropriate level to different sections of society.	15	Dr Anuschka Miller

	UF710717	**Deep-Sea Ecosystems** Conveys an understanding of current views of the structure, functioning and global role of deep sea ecosystems in the context of the changing image of the deep sea environment over the last century.	15	Dr David Hughes
	UMSO109	**Marine Environmental Impact Assessment** Developing a detailed understanding of the processes of environmental impact assessment in the marine environment.	15	Dr Thom Nickell
	UC110743	**Marine Modelling** Introducing students to the study of the dynamics of complex marine systems through the techniques of mathematical modelling.	15	Dr Shelia Heymans
	UC110748	**Palaeoceanography** Developing a detailed understanding of the study of paleocirculation and the controls on the development of palaeoceanographic conditions and the rates of climate change.	15	Dr Tracy Shimmield
	UF710750	**Polar Seas** A multi-disciplinary module that expands on concepts and knowledge gained during H1-H3. It will develop a detailed understanding of some of the unique physical processes, geological environments and ecosystem dynamics that characterise high latitude marine environments.	15	Dr Tim Boyd

Honours Dissertation Topics

The double module dissertation is a particularly important part of the honours level and the degree as a whole.

Dissertations may be undertaken in any field of marine science that can be supported by adequate supervision.

Each research group within SAMS will normally offer at least one dissertation topic. These will be made available to students in the second semester of level H3 to allow (where suitable or necessary) the practical element of the project work to be carried out during the summer break.

Notwithstanding this, sufficient time will be allocated during semesters 1 & 2 for project work.

Possible areas for dissertation topics include:

- Deep sea benthic dynamics and impact (including deep sea corals)
- Animal invironment interactions (including Loch Linnhe Artificial reef)
- Coastal impact (including environmental impact of aquaculture)
- Marine biodiversity and behaviour
- Invertebrate biology & mariculture
- Marine algae
- Marine microbiology
- Zooplankton dynamics
- Geochemistry
- Biogeochemistry of trace gases
- Biogeochemistry of organic matter
- Marine geology
- Marine physics
- Marine technology
- Sea ice dynamics

This list remains fluid and will be modified with the research interest and specialisations of SAMS.

Students will also be invited to submit their own dissertation topic should they so wish. This work may be conducted either within SAMS or within a suitable external agency or company, should suitable internal and external supervisors be available

Exit qualification with 120 SCOTCAT points (total over degree 480 points) at SCQF level 10:

BSc Marine Science with honours.

Module Leaders

For all modules in the marine science curriculum there will be a MODULE LEADER who will have overall responsibility for all aspects of the teaching and assessment of the module. Module Leaders will carry out these responsibilities within the constraints of the relevant regulations published in the concurrently published edition of the UHI Academic Standards and Quality Document. Module Leaders will be responsible to the Marine Science Examination Board via the appropriate Module Examination Committee.

Teaching and Learning Strategies

A variety of teaching methods will be employed with the most appropriate being used to achieve a particular objective. Innovative teaching methods will be developed and used wherever they can assist the student to acquire knowledge more effectively and more efficiently or where the special needs of individual learners make such methods appropriate or necessary. The range of teaching methods that will be used can be summarised as follows.

(a) **LECTURES AND TUTORIALS** - Lectures will be used as appropriate to convey information, extend academic knowledge. You are fortunate in the extreme to be studying at SAMS where group size is normally very small, thus allowing student centred problem solving exercises to be more easily integrated closely with lecture material. Students will also receive training in the use of video-conferencing equipment.

(b) **CASE STUDIES** - Case studies will be used extensively where relevant to enable students to apply their knowledge in real situations. These exercises will also encourage students to develop interpersonal skills.

(c) **FIELD COURSES AND FIELD EXERCISES** - Marine Science is an intensely practical set of disciplines and many of its applications to real situations will be best taught and understood in the field. Field exercises allow for the acquisition, analysis and reporting of field data and the enhancement of understanding of the interdisciplinary nature of the whole subject. The Highlands and Islands can provide a great variety of marine environments, landscapes and scenarios for study. During the BSc there will be two field courses (each of one week duration) which will enable the student to acquire and develop a range of practical field skills e.g. simple navigation, field safety etc. and to begin to use their scientific knowledge in a field situation. There will also be, in individual modules, a number of field exercises aimed at enhancing the understanding of particular scientific principles. The laboratory is well suited on a small peninsula in the Firth of Lorne, thus offering unique facilities for its work in marine research. The range of excellent facilities available at SAMS include 2 inshore research vessels (the ‘Calanus’ for inshore trawling and benthic sampling with wet and dry laboratories and accommodation for crew and 6 scientists and the smaller ‘Seol Mara’ for work in sheltered coastal waters and small diving operations), the National facility for scientific diving (including a recompression chamber) and a large aquarium.

(d) **LABORATORY WORK AND PRACTICAL EXERCISES** - Laboratory exercises will be used to develop skills in the use and applications of specific laboratory techniques, and to illustrate theory. Laboratory work will be delivered via individual modules but every opportunity will be taken to emphasise the interdisciplinary nature of Marine Science and the application of the skill and knowledge gained to the wider Marine Science context. The laboratory will be the "field" of application for those elements of Marine Science that cannot easily be demonstrated satisfactorily in the field.

(e) **SELF STUDY AND DIRECTED STUDY** - Degree level study is an exercise in the use of a person's intellectual, analytical and communication skills; an important aim of any course of study at this level is to ensure that the student develops the skills of independent learning. Students on the BSc Marine Science will research and report on a series of assignments, case studies etc. within the learning process for appropriate modules, developing information retrieval, study and reporting skills and their ability to analyse problems and situations in a scientific manner. Students will develop facility in the use of traditional libraries and electronic sources of information.

(f) **STUDY VISITS** - Study visits will be undertaken, as appropriate, to specific sites of marine interest. Students will complete a report on each visit.

(g) **SEMINARS** - The Scottish Marine Institute runs research seminars given by both NERC and SAMS personnel; Marine Science students are encouraged to attend these if possible in order to listen to scientific argument and to aid them in the development of their own scientific thought and reasoning. Whenever possible students will also be brought into contact with visiting scientists or with other scientists via video-conference. Students will also give short seminars to their peers on chosen topics of marine scientific interest.

The teaching methods used in any module will be drawn from those listed above. A balanced programme of field work, laboratory work, lectures and tutorials will be used.

Assessment

Assessment will occur via course work, tutorials and examinations.
All assessments will be moderated by small groups of appropriate people in order to ensure that the assessment is clearly and unambiguously stated and that it is fit for purpose with respect to the aims, outcomes, content and level of the module.
Module leaders will provide you with assessment schedules for each individual module and the requirements for passing these.

Assessments are usually handed in at reception where they will be signed for and passed to the relevant module leader.

Course Team Year Leaders

First Year (H1)
Ms Shona Magill **SAMS**

Second Year (H2)
Dr Henrik Stahl **SAMS**

Third Year (H3)
Dr Eleanor Bell **SAMS**

Fourth Year (H4)
Dr Adam Hughes **SAMS**