

School of Biology

Head of School Professor K T Sillar

Degree Programmes

M.Res.: Environmental Biology
Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences
Structural Proteomics.

Programme Requirements

Environmental Biology

M.Res.: BL5015, BL5018, BL5019, BL5021, ID5001, MT5752, MT5753 and 3 of the following: BL5009, BL5010, BL5011, BL5012, BL5013, MT5751

Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences

M.Res.: BL5015, BL5018, BL5019, BL5008, MN5020, MT5752, MT5753 and 3 of the following: BL5009, BL5010, BL5011, BL5012, BL5013, MT5751

Structural Proteomics

M.Res.: BL5050, BL5051, BL5052, BL5053, BL5054, BL5020

Modules BL5001 - BL5007 are designed to constitute a training for students who are accepted into a research degree in Biology, to equip them with the skills required for the completion of their research and provide them with the general skills necessary for undertaking a career as an academic biologist. Completing and passing these modules is a prerequisite for successful completion of the research degree. However, in cases where the students already have an appropriate research training, exemption from part or all of the modules may be agreed at the discretion of the Head of School. In the case of part-time students, or in the case of students arriving at non-standard times, the same session requirement could be waived at the discretion of the Head of School.

Modules

InterDisciplinary (ID) Modules

This School co-ordinates and contributes to an inter-disciplinary module – **ID5001 Enterprise, Creativity and Innovation**. This appears in the Interdisciplinary Section of the Catalogue (Section 13) as well as below.

BL5001 Research Training: Safety in Science

Semester: 1

Co-requisite: Modules BL5001 - BL5006 are to be taken together in the same session. In the case of part-time students or in the case of students arriving at non-standard times, the “same session” requirement may be waived at the discretion of the Head of School.

Programme(s): Compulsory module for all students doing a research degree in Biology.

Description: The course covers a wide range of essential information for the research student to work safely in the School of Biology and enables the student to make full use of available facilities. Seminars cover the University Safety Policy, risk assessment, fire safety, COSSH regulations, and first aid in the laboratory and the field. This course also includes the University Radiation Protection course.

Class Hour: To be arranged.

Teaching: Seven 1 hour seminars.

Assessment: Continuous Assessment = 100%

Biology – 5000 Level Modules

BL5002 Research Training: Reviewing the Literature

Semester: 1

Co-requisite: Modules BL5001 - BL5006 are to be taken together in the same session. In the case of part-time students or in the case of students arriving at non-standard times, the “same session” requirement may be waived at the discretion of the Head of School.

Programme(s): Compulsory module for all students doing a research degree in Biology.

Description: A short module offering practical advice on library orientation, access to journals and the maintenance of bibliography information. Further seminars cover aspects of information retrieval from library databases and the Internet. In addition the student is made familiar with the information technology systems available in the University.

Class Hour: To be arranged.

Teaching: Two 2 hour seminars.

Assessment: Present a review of relevant literature in the scientific field of the student’s research project (4,000 words) assessed by internal examiner.

BL5003 Research Training: Technical Approaches and Project Planning

Semester: 1

Co-requisite: Modules BL5001 - BL5006 are to be taken together in the same session. In the case of part-time students or in the case of students arriving at non-standard times, the “same session” requirement may be waived at the discretion of the Head of School.

Programme(s): Compulsory module for all students doing a research degree in Biology.

Description: The course will enable the student to develop a research plan detailing the overall aims, the planned technical approaches and the proposed handling of experimental results. The course will introduce the students to the range of biological techniques and the sources of biological expertise available. The student can then choose to investigate further techniques applicable to their own research area. The course offers information on experimental design and the statistical handling of data. To complement this module an additional seminar provides advice on maintaining good relationships between students and supervisor, and on maintaining direction in research.

Class Hour: To be arranged.

Teaching: Three 3 hour seminars.

Assessment: Produce a research plan (1000 words) assessed by internal examiner.

BL5004 Research Training: Writing a Report

Semester: 2

Co-requisite: Modules BL5001 - BL5006 are to be taken together in the same session. In the case of part-time students or in the case of students arriving at non-standard times, the “same session” requirement may be waived at the discretion of the Head of School.

Programme(s): Compulsory module for all students doing a research degree in Biology.

Description: This module includes seminars covering important aspects of communicating scientific findings to others within the scientific community. It also aims to inform the student of the consequences of commercialism and the legal aspects surrounding intellectual property rights. The course introduces the student to scientific writing skills, the structure of a report and the presentation of results.

Class Hour: To be arranged.

Teaching: Two 2 hour seminars.

Assessment: First year report (4000 words) examined by the Postgraduate Review Committee.

BL5005 Professional Skills: Visual Presentation

Semester: 1

Co-requisite: Modules BL5001 - BL5006 are to be taken together in the same session. In the case of part-time students or in the case of students arriving at non-standard times, the “same session” requirement may be waived at the discretion of the Head of School.

Programme(s): Compulsory module for all students doing a research degree in Biology.

Description: This module aims to enable the student to use a variety of information technology and media techniques to create visual representations of the research projects. The production of personal web pages to promote the research project of the student is encouraged. In year 2, students are provided with training and support in the production of a poster presentation for the Annual Postgraduate Conference.

Class Hour: To be arranged.

Teaching: Two 2 hour seminars.

Assessment: Feedback is given on the student’s personal web page and on a Poster presentation at the Annual Postgraduate Conference in year 2.

BL5006 Advanced Topics in Biology

Semester: Whole Year

Co-requisite: Modules BL5001 - BL5006 are to be taken together in the same session. In the case of part-time students or in the case of students arriving at non-standard times, the “same session” requirement may be waived at the discretion of the Head of School.

Programme(s): Compulsory module for all students doing a research degree in Biology.

Description: The aim of this course is to familiarise the student with recent advances in current research across a range of biological subjects. Students will attend sets of seminars given by invited speakers and also by staff within the School of Biology. They will be encouraged to participate in discussion sessions following seminars and to follow up areas of interest by reading publications by the speakers.

Class Hour: To be arranged.

Teaching: Seminars.

Assessment: Written critique on seminar content is submitted to postgraduate tutors.

BL5007 Professional Skills: Oral Presentation

Semester: 1

Prerequisite: Modules BL5001 - BL5006

Co-requisite: Module BL5007 is to be taken in the first session of year 3. In the case of part-time students or in the case of students arriving at non-standard times, these requirements may be waived at the discretion of the Head of School.

Programme(s): Compulsory module for all students doing a research degree in Biology.

Description: This module aims to complete the formal development of the postgraduate biology student by providing an informal environment in which the student can develop techniques necessary for presentation at scientific conferences and at other fora. The course provides seminars on the skills involved in presenting talks on scientific topics. The seminars cover the value of structure, the production of visual aids, media skills and the development of individual style and technique. The supervisor assists in the preparation of a practised, well-delivered, oral presentation.

Class Hour: To be arranged.

Teaching: Two hour seminar.

Assessment: Oral presentation (20 minutes) at the Annual Postgraduate Conference.

Biology – 5000 Level Modules

BL5008 Basic Concepts in Ecology and Evolution

Credits: 15.0 Semester: 1 (3 weeks)

Programme(s): Compulsory module for M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programme.

Description: 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 (6 lectures) will address single-species populations and their growth, competition and its consequences, and predation and related processes. The evolution section (6 lectures) 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.

Class Hour: To be arranged.

Teaching: 4 lectures and one tutorial each week for 3 weeks.

Assessment: Continuous Assessment = 40%, One-and-a-half Hour Examination = 60%

BL5009 Plant Responses to their Environment

Credits: 10.0 Semester: 1 (2 weeks)

Programme(s): Optional module for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Description: 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.

Class Hour: To be arranged.

Teaching: 3 lectures, one tutorial and one practical each week for 2 weeks.

Assessment: Continuous Assessment = 40%, One-and-a-half Hour Examination = 60%

BL5010 Marine Ecology and Physiology

Credits: 10.0 Semester: 1 (2 weeks)

Programme(s): Optional module for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Description: This module will investigate how simple Newtonian mechanics and consideration of scale can explain many important phenomena at the level of cells, tissues, whole animals and the large scale properties of ecosystems. The lecturers will illustrate the principles with respect to their own research on muscle growth and locomotion, ion and water transporting epithelia, the distribution and behaviour of pelagic organisms and larval recruitment. This theme allows the introduction of central ecological and physiological issues in a context relevant to the previous experience of the participants.

Class Hour: To be arranged.

Teaching: 3 lectures, one tutorial each week for 2 weeks and one practical class.

Assessment: Continuous Assessment = 40%, One-and-a-half Hour Examination = 60%

BL5011 Conservation Biology

Credits: 10.0 Semester: 2 (2 weeks)

Programme(s): Optional module for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Description: 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.

Class Hour: To be arranged.

Teaching: 5 lectures each week for two weeks, one tutorial, one practical class and one workshop.

Assessment: Continuous Assessment = 40%, 2 Hour Examination = 60%

BL5012 Environmental Genomics

Credits: 10.0 Semester: 2 (2 weeks)

Programme(s): Optional module for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Description: 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.

Class Hour: To be arranged.

Teaching: 3 lectures, one tutorial each week for two weeks and one practical class.

Assessment: Continuous Assessment = 40%, One-and-a-half Hour Examination = 60%

BL5013 Environmental Microbiology and Ecotoxicology

Credits: 10.0 Semester: 2 (2 weeks)

Programme(s): Optional module for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Description: 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.

Class Hour: To be arranged.

Teaching: 3 lectures, one tutorial each week for 2 weeks and one practical class.

Assessment: Continuous Assessment = 40%, One-and-a-half Hour Examination = 60%

BL5015 Essential scientific skills and legislation

Credits: 0 Semester: 1 (1 week)

Programme(s): Compulsory module for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Description: 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.

Class Hour: To be arranged.

Teaching: 1 lecture and one seminar.

Assessment: Continuous Assessment = 100%

Biology – 5000 Level Modules

BL5018 Case Studies in Environmental Biology

Credits: 20.0 Semester: 2 (8 weeks)

Programme(s): Compulsory module for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Description: 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.

Class Hour: To be arranged.

Teaching: One lecture, one seminar each week for 8 weeks and additional workshops.

Assessment: Continuous Assessment = 100%

BL5019 Research Project

Credits: 55.0 Semester: Summer

Programme(s): Compulsory module for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Description: 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.

Teaching: To be arranged.

Assessment: Continuous Assessment = 100%

BL5021 Basic Concepts in Mathematical and Statistical Analysis

Credits: 15.0 Semester: 1 (3 weeks)

Programme(s): Compulsory module for M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Description: 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.

Class Hour: To be arranged.

Teaching: 3 lectures, 2 tutorials and 3 practical classes.

Assessment: Continuous Assessment = 75%, 1 Hour Examination = 25%

BL5050 Proteomics and Molecular Biology

Credits: 20.0 Semester: 1

Programme(s): Compulsory Module for M.Res in Structural Proteomics

Description: The module will introduce students to modern techniques used in molecular biology and proteomics research. These include gene cloning, gene expression using a variety of expression hosts, and protein purification methodologies. Techniques of proteomics include 2D gel electrophoresis and the use of mass spectrometry and bioinformatics for protein identification. The lectures are complemented by web-based practicals exploring and using a wide variety of bioinformatic resources, and practicals on cloning and protein purification.

Class Hour: To be arranged.

Teaching: 2 lectures, one fortnightly tutorial, one full day practical class every three weeks.

Assessment: Continuous Assessment = 34%, 3 Hour Examination = 66%

BL5051 Structural Biology and Biophysics

Credits: 20.0 Semester: 1

Programme(s): Compulsory Module for M.Res in Structural Proteomics

Description: The module will introduce students to modern techniques used in structural biology: X-ray crystallography, NMR and cryo-electron microscopy. Other complimentary spectroscopic methods used to characterise protein function and kinetics will also be explored, as will calorimetry as a means to obtain thermodynamic information. The use of robotics in high throughput structural biology will be discussed. Recent advances in optical manipulation and microscopy will be presented. A mixture of lectures, demonstrations and practicals will be used to illustrate and investigate the various methods.

Class Hour: To be arranged.

Teaching: 2 lectures, one fortnightly tutorial, one full day practical class every three weeks.

Assessment: Continuous Assessment = 34%, 3 Hour Examination = 66%

BL5052 Structural Proteomics: Practical Skills

Credits: 10.0 Semester: 1

Programme(s): Compulsory Module for M.Res in Structural Proteomics

Description: Three extended practicals will be undertaken. The first will involve proteomics techniques: the use of 2-D gel electrophoresis, mass spectrometry and bioinformatics to identify proteins. The second will use molecular graphics to investigate protein structure and molecular modelling. The third will involve designing a web site.

Class Hour: To be arranged.

Teaching: Three-day practical class every three weeks.

Assessment: Continuous Assessment = 100%

BL5053 Structural Proteomics Project I

Credits: 50.0 Semester: 2

Programme(s): Compulsory Module for M.Res in Structural Proteomics

Description: An extended research project will be carried out in a research laboratory within the Centre for Biomolecular Sciences or School of Physics. 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 and presented in a research seminar format.

Class Hour: To be arranged.

Assessment: Continuous Assessment = 100%

BL5054 Structural Proteomics Project II

Credits: 60.0 Semester: Summer

Programme(s): Compulsory Module for M.Res in Structural Proteomics

Description: An extended research project will be carried out in a research laboratory within the Centre for Biomolecular Sciences or School of Physics. 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 and presented in a research seminar format.

Class Hour: To be arranged.

Assessment: Continuous Assessment = 100%

Biology – 5000 Level Modules

ID5001 Enterprise, Creativity and Innovation

Credits: 20.0 Semester: 1

Programme(s): **Compulsory module** for M.Res in Environmental Biology and M.Res in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Optionally available to all Postgraduate Taught Programmes, subject to approval of Course Director/Coordinator within individual Schools.

Description: Engendering a culture of enterprise, this module integrates the theory of entrepreneurship with the practical application of new business creation and development. A combination of real-life case studies and seminars from serial entrepreneurs and other business professionals will assist candidates to access their latent creativity and innovation for idea generation. Together, this will enable students to demonstrate a sound understanding of all aspects of the commercialisation process, including the significance and protection of intellectual property rights. This will play a vital role within the group project of producing a business plan/proof of concept application/research project.

Class Hour: To be arranged.

Teaching: 8 lectures and seminars over 10 weeks.

Assessment: Continuous Assessment = 100%

MT5751 Estimating Animal Abundance

Credits: 10.0 Semester: 2 (2 weeks)

Programme(s): Optional module for M.Res. in Environmental Biology and M. Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Description: 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.

Class Hour: To be arranged.

Teaching: 4 lectures, one tutorial and two practical classes each week for 2 weeks.

Assessment: Continuous Assessment = 40%, 2 Hour Examination = 60%

MT5752 Modelling Ecological Dynamics

Credits: 20.0 Semester: 2 (4 weeks)

Prerequisite: BL5021 or substantial quantitative training

Programme: Compulsory module for M.Res. in Environmental Biology and M.Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Description: This module is designed to provide practical training in the construction and use of mathematical models of ecological dynamic systems. The module will start by covering basic dynamical concepts and mathematical tools, and will then cover modelling of individuals, single species populations, interacting populations and ecosystems. At all stages students will be expected to build and analyse models, with a combination of pencil and paper and computer software.

Class Hour: To be arranged.

Teaching: 4 lectures, one tutorial and 3 practicals each week for 4 weeks.

Assessment: Continuous Assessment = 40%, 2 Hour Examination = 60%

MT5753 Statistical Modelling

Credits: 20.0 Semester: 1 (4 weeks)

Programme: Compulsory module for M.Res. in Environmental Biology and M. Res. in Environmental Biology Conversion for Mathematical, Physical and Molecular Sciences Postgraduate Taught Programmes.

Description: This course will introduce the main ideas of linear and generalised linear statistical modelling and will provide training in applied statistical modelling. The course 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.

Class Hour: To be arranged.

Teaching: 4 lectures, one tutorial and 3 practicals each week for 4 weeks.

Assessment: Continuous Assessment = 40%, 2 Hour Examination = 60%