M.Sc. in Biodiversity Conservation and Sustainable Development in the Caribbean - Core Courses

Course Code/Name: BIOL6200/Characteristics of Biodiversity

Lead University: University of Belize

Course Leader: Dr Arlenie Perez

Teaching Team: Dr. Arlenie Perez, Dr. Caroline Herron, Dr. Elma Kay, Dr. Leandra Cho-Ricketts, and Dr. Thippi Thiagarajan

Credits: 3

Core/Optional: Core

Semester: 1

Prerequisites: None

Course Description
This course forms part of the background information to the programme. It includes a review of basic concepts of biodiversity from the molecular- to ecosystem- level, and This will be placed in the context of the current extinction crisis and international treaties such as the Convention on Biological Diversity formulated to address this crisis. The course also highlights the importance of biodiversity in terms of ecosystem function, goods and services.

“Characteristics of Biodiversity” will define biodiversity in terms of species richness and diversity indices and explore the cline in diversity across different latitudes. Within this, concepts such as endemism and keystone species will also be described. The molecular genetic component of the course will cover the concepts of molecular genetics, intra-specific variation, inter and intra-specific genetic diversity, processes of evolution and speciation.

The course will then go on to review the characteristics of regional ecosystems in the Caribbean, including forest, savannah, riverine, wetland, mangrove and coastal-marine systems including coral reefs, beaches and estuaries. Impacted ecosystems such as urban and agricultural landscapes will also be treated, as well as the ecosystem patterns unique to Caribbean island ecosystems. In each case the systems will be considered holistically in relation to their diversity, distribution, ecology and ecosystem function, including the goods and services they provide.
Course Code/Name: BIOL6201/Threats to Tropical Biodiversity

Lead University: UWI – St. Augustine

Course Leader: Dr Luke Rostant and Dr Howard Nelson

Teaching Team: Professor Andrew Lawrence, Professor Pathmanathan Umaharan, Dr Mary Alkins-Koo, Dr Mike Oatham, Dr Dawn Phillip, Dr Howard Nelson, Dr Luke Rostant

Credits: 3

Core/ Option: Core

Semester: 1

Prerequisites: None

Course Description

This course provides a detailed review of the main threats facing global biodiversity and in particular, tropical biodiversity. It will describe the critical processes affecting a variety of tropical systems and explore the underlying pressures on these ecosystems. As such, it complements BIOL6200 in providing the fundamental framework and concerns which underpin and drive current environmental management practices.

“Threats to Tropical Biodiversity” examines the major threats to tropical biodiversity and ecosystems, as described in the CBD: habitat loss and degradation, over-exploitation, climate change, pollution and introduction of alien species. It also examines the history of human intervention in tropical environments. In specific relation to loss of genetic diversity, issues including threats to genetic diversity, loss of populations, reductions in heterozygosity and their consequences, inbreeding depression and genetic bottlenecks will be reviewed.

Throughout the course, examples and case studies of major threats will be considered in relation to the impacts known for the ecosystems described in BIOL6200. It will include a description of human-altered terrestrial and coastal environments.

Consideration will also be given to the issues of environmental stress including impacts of pollution and climate change on terrestrial and marine systems. Evidence for the impacts of global warming on species and ecosystems, and methods for the detection of climate change are also covered in this course.
Course Code/Name       BIOL6206/Management and Analysis of Environmental Data
Lead University      UWI – St. Augustine
Course Leader        Dr Luke Rostant
Teaching Team        Dr Luke Rostant
Credits:             3
Core/ Optional       Core
Semester             1
Prerequisites        None

**Course Description**

The aim of this course is to provide students with a fundamental understanding of the importance of storage, retrieval and analysis of environmental data. In particular, the course will provide practical training in statistical analysis of environmental data and demonstrate the storage and retrieval of biodiversity information using national and international databases. As such, this course will show students how data, through appropriate management and analysis, becomes information, which then informs the decision-making process. In addition, it will provide the student with fundamental skills, which may underpin many elements of their future research project and career.

Students will initially review fundamental univariate numerical techniques, including basic parametric and non-parametric statistics. Students will then complete task sheets which, thereby, demonstrate an understanding of the application of appropriate tests to datasets. These sheets will be completed using either of the statistical package Statistix and/or Minitab, and they will also be introduced to the R environment.

The course will then progress to explore the use of multivariate statistical techniques to analyse detailed environmental datasets. Students will also be introduced to the use of Bayesian statistics, and biodiversity-specific data analysis software including ECOM II, Primer, CAP4, SDR4, DISTANCE and Vortex.
Course Code/Name  BIOL6208/Conservation & Management of Biodiversity

Lead University  UWI – St. Augustine

Course Leader  Dr Howard Nelson

Teaching Team  Professor Andrew Lawrence, Dr Howard Nelson, Professor Pathmanathan Umaharan, Dr Dawn Phillip

Credits:  3

Core/ Option  Core

Semester  2

Prerequisites  None

Course Description
This aim of this course is to highlight some of the key concepts and approaches to the conservation and management of topical biodiversity. Students will gain an understanding of the possible conservation approaches available to environmental managers and how these have been informed by fundamental science. In addition, students will gain an understanding of how conservation priorities are determined globally and how these priorities have been implemented at a national and regional level. As such, this course will give the student an appreciation of current management approaches applied to the conservation of biodiversity and how this interfaces with other aspects of the programme.

Conservation elements of the course will include development of priorities for conservation, conservation of genes and genetic diversity, selection and design of protected areas, the application of island biogeography theory and SLOSS, population dynamics and population viability analysis to protected area design. Students will gain an understanding of the principles of protected area selection site management. The use of zoning schemes, particularly in relation to coastal zone management schemes will also be covered. The use of management plans will be discussed together with the assessment of management effectiveness.

The course will also examine ex-situ conservation programmes and re-introductions of species as well as aspects of habitat restoration. The important role and participation of the public will also be considered with regard to the selection, design and management of protected areas as well as through the potential benefits of tourism and ecotourism.
Course Code/Name  BIOL6210/Field Practicum

Lead Universities  University of Belize (Marine) and Anton de Kom Universiteit van Suriname (Terrestrial)

Course Leader  Dr. Elma Kay & Dr. Paul Ouboter

Teaching Team  Dr Elma Kay, Dr Paul Ouboter, Professor Andrew Lawrence, Dr Leandra Cho-Ricketts

Credits  3

Core/ Option  Core

Semester  3

Prerequisites  None

Course Description
This course is designed to provide students with the practical skills required to investigate specific research and monitoring questions, as well as conduct survey work. Results of work carried out in the field will be analyzed using various statistical techniques and will be mapped using GIS. This course comprises the main practical portion of the programme. It will provide students with the opportunity to apply and test their understanding of concepts covered in the taught courses of the programme. The course will go over the appropriate collection and survey techniques for various taxa. Status surveys and other population ecological work will be covered. Socio-economic survey work will also be undertaken in the field.
Course Code/Name: BIOL6211/Research Project

Lead University: Varies depending on location of student’s primary supervisor

Course Leader: Dr Howard Nelson

Course Team: Staff engaged in the delivery of the M.Sc.

Credits: 12

Core/Option: Core

Semester: 1, 2 and Summer

Prerequisites: None

Course Description
The aim of the research project is to allow the student to synthesise and articulate several aspects of the taught programme within a single themed research topic. In addition, it provides the opportunity for further detailed skills training in aspects of environmental monitoring, assessment or management of tropical biodiversity. It will allow the student to pursue an individual study on a particular research topic or issue of interest to the student and will incorporate technical skills training specific to the individual student. As such, the research project will provide the opportunity to develop a specific set of practical and reporting skills that will be of use to the student in their future career.

The Research Project is a fundamental component of the M.Sc. programme and this is reflected in the credit weighting, and by the fact that the M.Sc. runs for an extra 6 months, to provide the student with the necessary time to complete the project to a high standard.

Students will consult with the Course Leader or Focal Point early on in the M.Sc. to discuss potential ideas for their research project. A list of potential projects will be also be made available for those students who do not have a specific topic in mind. During the second semester, the student and course leader/Focal Point will meet to further develop the research project idea, develop clear aims and objectives, and identify appropriate second supervisors.

The research project may cover any feasible aspect of environmental management of tropical biodiversity. It may involve a pure research study on a fundamental aspect of tropical biodiversity or address more applied issues. It may involve field or laboratory work or may be a desk study involving data analysis or interrogation of legal documents. It may support studies being undertaken by staff within the 4 partner universities, or it may address an issue related to a student’s employer. For students from outside of the 4 partner countries, the project may be undertaken within the country hosting one of the 4 partner universities, or in the student’s home country.
The project should give the student a chance to further develop skills taught during the programme and provide the opportunity to cultivate a more detailed understanding of some specific component of the programme.

**Course Code/Name**  BIOL6212/Taxonomy and Biodiversity Informatics  
**Lead University**  Anton de Kom Universiteit van Suriname  
**Course Leader**  Dr. Paul Ouboter  
**Teaching Team**  Dr Paul Ouboter, Mrs Yasmin Comeau  
**Credits**  3  
**Core/ Option**  Core  
**Semester**  1  
**Prerequisites**  None  

**Course Description**  
This course will stress the importance of taxonomy in biodiversity conservation. It will provide students with knowledge of the principles of taxonomic rules and classification systems, and existing biodiversity informatics tools. Students will be able to apply this knowledge through the use of natural history collections, and taxonomic and biodiversity databases.

This course is a core course in the programme, providing an understanding of the description and classification of organisms as the basis for biodiversity conservation. It provides an overview of the status of taxonomy and various classification systems as well as a summary of the speciation process, biogeography and the field of molecular systematics. Species are highlighted as the building block for taxonomic classification and species concepts are discussed in detail.

During the course, students learn to appreciate the role of natural history museums and herbaria together with their collections. Collection and preservation methods for various taxa are presented and their curation is discussed. Identification methods and tools, including taxonomic keys, are presented and used as part of the course.

The course includes a bioinformatics component that focuses on the use of online databases, as well as those found at local institutions. These include biodiversity databases, molecular databases and natural history collection databases. By the end of the course, students learn to use various databases to derive biodiversity information. The use of database software is also emphasized as a tool for the creation of new biodiversity databases.
Course Code/Name  BIOL6214/Environmental Resources Policy

Lead University  University of Guyana

Course Leader  Mr. John Caesar (University of Guyana)

Teaching Team  Mr. John Caesar, Dr Howard Nelson, Professor Andrew Lawrence

Credits  3

Core/ Option  Core

Semester  2

Prerequisites  None

Course Description
This policy course provides an overview of the foundations for environmental resource policy evolution and the linkages with wider socio-economic and socio-ecological issues. Students will be exposed to the various concepts of environmentally and ecologically sustainable development processes emerging from social consciousness of environmental impacts on natural resources and their management. It provides a review of the basic principles involved in setting environmental resource management goals, and a means for understanding how development of a consensual vision in environmental resource policy, is framed by the policy process.

Development of policy for key natural resource areas using best practices in the policy process will be reviewed in this course. Environmental Resources Policy will explore the relevant issues and techniques for scoping and developing environmental resource policies. Students are will prepare policy briefs for specific environmental and natural resource issues, including a step-by-step policy making exercises and simulations of practical problems and issues involved in the policy making process. Overviews of carefully selected international environmental instruments and their nexus with global natural resource management and environmental drivers will be provided. The course will enable students to develop a basic understanding and appreciation of environmental resource governance models and how these influence policy.