

Department of Life Sciences

MSc in Natural Resources Management : Marine and Terrestrial Ecosystems (NRM:MaTE) Specialisation

AIMS AND OBJECTIVES

Aim

The primary aim of this M.Sc. in Marine and Terrestrial Ecosystems (MaTE) programme is to provide a regionally integrated approach to marine and terrestrial ecosystems management. This will be accomplished through training and research, geared towards the empowerment of graduate students and professionals with knowledge of marine and terrestrial ecosystems and associated processes. This will also involve the collection and analysis of data required for the detailed study of these areas and the knowledge of biological and other interventions for conservation, monitoring and integrated management of marine and terrestrial ecosystem resources towards sustainable use.

Objectives

At the end of this programme students will be able to:

1. identify the issues affecting terrestrial and marine communities and the processes which make these systems unique;
2. appropriately use GIS, Geoinformatics, remote sensing as well as other environmental tools in the study of the environment;
3. outline environmental management strategies that integrate biological, political, legal, social and ethical issues as well as design appropriate interventions to conserve threatened species and environments;
4. execute sound research for monitoring and providing solutions for problems related to the environment.

CRITERIA FOR ADMISSION

B. Sc. honours degree in biological sciences.

MODE(S) OF DELIVERY

The programme will be delivered using a variety of mechanisms including face-to-face lectures, seminars, tutorials, field visits and a research project. It will also include project and scenario based workshops, case studies and assignments in which group work and student centred learning approaches will be used. Students will be encouraged to take responsibility and control of their own learning. This will culminate in the final research project in which students will be responsible for the conduction and reporting of a project with the assistance of a supervisor who is an expert in the chosen area.

The programme will be taught full-time but with 5:00 to 8:00 p.m. delivery of lectures/tutorials and seminars; with Laboratory sessions and Field trips on a Friday or Saturday. This will be supported by the UWI course management programme OurVLE.

PROGRAMME STRUCTURE

MSc. NRM:MaTE Specialisation

Course Code	Course Title	Credits
NRM CORE		
ENVR6401	Environmental Law and Multilateral Environmental Agreements	3
ENVR6402	Research Methods and Project Management	3
ENVR6403	Environmental Impact Assessment	3
ENVR6404	Principles and Practice of Geoinformatics	3
ENVR6405	Management and Analysis of Environmental Data	3
ENVR6406	Socio-ecology and Natural Resource Management	3
	Sub Total	18
DLS SPECIALISATION		
BIOL6411	Threats to Tropical Biodiversity	3
BIOL6412	Conservation & Management of Biodiversity	3
BIOL6413	Sustainable Use and Management of Natural Resources	3
BIOL6414	Integrated Coastal Zone Management	3
BIOL6415	Natural Resources and Project Management for Environmental Education	3
ENVR6407	Environmental Economics (not required by students doing BIOL6550-Environmental Research Project)	3
	Sub Total	18
ENVR 6500	Environmental Project OR	9
BIOL6550	Environmental Research project	12**
	TOTAL CREDITS	45

** Access to BIOL6550 is contingent on student performance in the Semester 1 courses.

THE DIPLOMA

A Diploma in **Marine and Terrestrial Ecosystems** will be awarded to persons completing 15 credits of the MaTE specialization courses + any other 9 credits from the programme.

Delivery Schedule Academic year 2011/2012 to 2012/2013

Semester 1: 13 weeks of teaching: September to November

Six courses taught in pairs and each lasts for 4 weeks.

Week 1 – 4	ENVR6402 - Research Methods and Project Management	
Week 1 – 4	ENVR6406 - Socio-ecology and Natural Resource Management	
Week 5 – 8	ENVR6404 - Principles and Practices of Geo-informatics	
Week 5 – 8	ENVR6405 - Management and Analysis of Environmental data	
Week 9 – 12	ENVR6403 - Environmental Impact Assessment	
Week 9 – 12	ENVR6401 - Environmental law and Multilateral Environmental Agreements	
Week 13	Course work collection / assessment	1 wk.
Week 14	1 st semester examinations	3 wks.
Christmas Break:	3 wks. December to mid-January	

Semester 2: 13 weeks of teaching: January to April.

Week 1 – 4	ENVR6407 - Environmental Economics (not required by students doing BIOL6550 - Environmental Research Project)	
Week 1 – 4	BIOL6411 - Threats to Tropical Biodiversity	
Week 5 – 8	BIOL6412 - Conservation & Management of Biodiversity	
Week 5 – 8	BIOL6413 - Sustainable Use and Management of Natural Resources	
Week 9 – 12	BIOL6414 - Integrated Coastal Zone Management	
Week 9 – 12	BIOL6415 - Natural Resources and Project Management for Environmental Education	
Week 13	Course work collection / assessment	1 wk.
Week 14	1 st semester examinations	3 wks.

EITHER

Summer Period & Semester 3

June –November	ENVR6500 - Research Project	12 wks.
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The project must be submitted for examination by December 1.

Length of programme: Three semesters and a summer. This excludes time taken for examination of the project. Candidates will be required to register Research Project “incomplete” in September 2012 and “exams only” in January 2013 after submitting the project in December.

OR

Summer Period & Semester 3

June – February BIOL6550 – Environmental Research Project 20 wks.

The project must be submitted for examination by March 1.

Length of programme: Two semesters or courses, and two semesters and a summer of project research. This includes time taken for examination of the project. Candidates will be required to register for the Research Project as “incomplete” in September 2012 and January 2013 in order to submit the project in March.

Weekly Schedule:

Each Course will have:
6 hours of lecture

Two evenings per week- 5:00 – 8:00 p.m. each. (Monday to Thursday)
(2 courses at a time = 4 evenings per week)

6 hours of laboratory/field trips/tutorials/seminars
Friday or Saturday (10 a.m. – 5 p.m.) with 1 hr. for lunch.

If traveling time is required for field trips the period becomes 8 a.m. to 5 p.m. (~2 hrs. for traveling) with 1 hr. for lunch.

Total Contact and Credit hours for each course:

6 hours of lecture per week for 4 weeks = 24 hours of contact and 24 credit hours
6 hours of labs/tutorials/seminars for 4 weeks = 24 hours of contact and 12 credit hours

Total Contact hours = 48 and total Credit hours for each course = 36

The course load per semester for the M.Sc. will be 6 courses in Semester 1 and 5 or 6 courses in Semester 2.

COURSE DESCRIPTIONS

ENVR6401	Environmental Law and International Environmental Agreements
Credits:	3
Semester:	1
Course Leader:	Professor Dale Webber
Teaching Team:	Mrs. Laleta Davis-Mattis

Aims and Distinctive Features

This course will provide students with a working knowledge of the philosophical bases and key principles of environmental management, general foundations/sources of environmental law, and an introduction to the history, structure and function of current international environmental agreements (IEAs) specifically related to biodiversity conservation. It will describe specific sector regimes, enforcement of environmental laws and international and regional environmental law. The course will provide students with a clear understanding of the current regional legislative models for biodiversity conservation, and critical international agreements on biodiversity protection.

Course Description

This course will provide students with a background to the sources for existing environmental laws, and of the specific framework for regulation of the environment in the Caribbean region.

It will examine the ways in which human behaviour with respect to the environment is regulated at the international level, with specific reference to key biodiversity-related IEAs. This will involve a brief review of the legal and institutional framework within which international law making on the environment takes place. The course will provide students with a basic understanding of the existing legal environmental regimes of selected Caribbean countries.

The course will then articulate this regional framework within its international context. The course will introduce students to some of the factors that surround and influence the negotiation and implementation of international environmental law. Key IEAs, including the Convention on Biological Diversity, the Biosafety Protocol, the UN Convention on Climate Change, Cartagena Convention, RAMSAR, CITES and Principle on Forests will be used as examples to illustrate the key issues. Students will also be introduced to key regional environmental agreements, including the Cartagena Convention, SPAW Protocol. Additionally, students will be introduced to key issues specific to biodiversity conservation including bio-piracy, liability and redress, access and benefits sharing, and existing legal models for management of cross-border resources including migratory species and cross-jurisdictional protected natural areas.

Learning Outcomes

The student who successfully completes this course will be able to:

1. Describe the basic components of environmental law
2. Describe the application and enforcement of environmental law
3. Explain the existing regional legal frameworks for environmental protection
4. Describe the current suite of IEAs and discuss relevant issues related to their regional implementation
5. Summarise and present on a topic relevant to environmental law and IEAs
6. Demonstrate the possession of interpersonal and teamwork skills
7. Demonstrate the possession of skills in self-management

Mode of delivery

Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Assessment:

Coursework	50%
Project & presentations	35%
Essay	15%
Final Examination (One two hour examination)	50%

Case studies will be prepared in advance by the various groups and presented to the lecturer and the rest of the class on specified dates. To enable students to obtain maximum benefit from projects, the assessment of projects will be based on the formal group document and the participation of individual members of the group presenting the project in online discussion sessions.

Recommended Reading:

- Anderson, W. 2002. Caribbean environmental law: Development and application. UNEP, Mexico, DF.
- Moss, S.G. (Compiler) [undated]. [*Caribbean Environmental Law Index*](#)
- Ramlogan, R. 2004. *The Developing World and the Environment: Making the Case for Effective Protection of the Global Environment*. University Press of America, Maryland: ISBN-13: 978-0761828785
- Ramlogan, R., and N. Persadie. 2004. Developing Environmental Law and Policy, In: *Trinidad and Tobago*. Lexicon Press, Trinidad.
- Stephen Brush, Santiago Carrizosa, Brian Wright and Patrick McGuire. 2004. *Assessing Biodiversity and Sharing the Benefits: Lessons from Implementing the Convention on Biological Diversity*. IUCN Environmental Policy & Law Paper, IUCN, Gland.

Reference Texts:

- Birnie, P., and A. Boyle. 2002. *International Law & the Environment*, 2nd ed. Clarendon Press, London.
- Brown Weiss, E. S. McCaffrey and D. Magraw. 2006. *International Environmental Law & Policy*. 2nd ed. 1145 pp.
- Brown Weiss, E., D. Magraw and P. Szasz 1992-1999. *International Environmental Law: Basic Instruments and References. Volumes 1& 2*.
- Brunnée, J. and E. Hey. 2000. *Yearbook of International Environmental Law*. Volume 11. 896 pp.
- Gillespie, A. 2000. *International Environmental Law, Policy & Ethics*, 2nd ed.
- Kiss, A., & D. Shelton. 2004. *International Environmental Law*, 3rd ed. 837 pp.
- Sands, P. 2003. *Principles of International Environmental Law*, 2nd ed. Cambridge University Press, London.

ENVR6402	Research Methods and Project Management
Credits:	3
Semester:	1
Course Leader:	Dr. Vivienne Vassell
Teaching Team:	Dr. Vivienne Vassell; Dr. Claudel Noel; Dr. Karl Aiken

Aims and Distinctive Features

The goal of this course is to provide students with a solid background in the philosophy of research, research design, in modern methods of data and information collection, as well as in data handling and analysis for environmental management. This will include an introduction to the conceptual and practical aspects of qualitative and quantitative research and the types of topics for which each approach is useful. Students will be introduced to various quantitative and qualitative analytical methods including media and public education, participant observation, participatory action research, media and textual analysis as well as software for data analysis. The modules will provide the student with a broad range of research skills which can be utilized both for the specific Masters project and as a basis for more long-term projects. The course also aims to develop student skills in making oral presentations as well as writing for scientific papers and technical reports.

Learning Outcomes

On successful completion of the course, the student will be able to:

- outline the principles of scientific research.
- outline the scientific procedures and setting up research questions and hypotheses
- plan and conduct effective search strategies to retrieve, evaluate and identify useful sources
- devise methods appropriate to the questions or hypotheses of a research topic or course of study
- integrate and present information in a coherent and logical form with correctly cited references.

Course Description

*Module 1: Scientific procedures and setting up research questions and hypotheses; project proposals and planning
(K. Aiken and V. Vassell)*

This Module will examine the purpose of research, paradigms and approaches that shape research and research ethics. Fundamentals of research proposal writing – rationale for proposals, core elements, choosing a topic, the research problem, literature review will follow and finally students will be exposed to alternative knowledge claims, styles of social inquiry (qualitative, quantitative, mixed methodologies), quantitative research design, sampling research techniques and instruments of data collection.

Module 2: Qualitative analysis; participatory research methods; data collection and management (V. Vassell)

This module will examine qualitative and quantitative research by analyzing the strengths and weaknesses of the qualitative approach. An overview of qualitative methods will present: Ethnography, Projective techniques, Observation, Focus groups and Interviewing as well as some issues in qualitative research.

Qualitative Analysis Content analysis, Visual analysis and practical applications of content analysis and visual methodologies will be covered by In-class exercises.

Finally the module will introduce students to questionnaire construction including theoretical perspectives considerations in constructing a questionnaire, types of questions, Layout, Pre-testing and ethical considerations.

Module 3: Quantitative techniques and data presentation for scientific papers and technical report writing (C. Noel)

This module presents alternative knowledge claims including positivism and experimental, interpretive, critical theory (advocacy/participative) and pragmatism.

Student will also be introduced to styles of social inquiry: quantitative, qualitative and mixed methodologies as modes of research as well as the modalities of integration in mixed methodologies.

The module will demonstrate the concept of Unit of Analysis or Unit of Observation, types of sampling procedures and appropriate selection procedures leading to random or probability sampling as well as non-probability sampling and triangulation. Details of sample size, statistical estimations, sources of data and the differences between primary and secondary data will be explained and demonstrated.

A discussion on levels of measurement, parametric and non-parametric test will precede statistical significance tests including but not limited to Chi-square, Correlations. Linear Regression. Logistic Regression, Anova and Manova.

Mode of delivery

Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Assessment

One type written dissertation (Research proposal & Literature review)	50%
Seminar (Oral presentation of research proposal & review)	20%
Coursework	30%
(Consisting of: End of course test	15%)
(Written assignments	15%)

Recommended reading:

Leedy, P.D. and J.E. Ormrod, 2000. Practical research: planning & design. Prentice Hall College Division. ISBN 0139603603. US\$ 56.

Van Wageningen, R. K. 1991. Writing a thesis: substance and style. Prentice Hall, Inc. ISBN 0-13-971086-8

ENVR6403	Environmental Impact Assessment
Credits	3
Semester	1
Course Leader:	Professor Dale Webber
Teaching Team:	Professor D. Webber; Dr. A. Hayman; Mr. O. Grey

Aims and Distinctive Features

This course provides an overview of the variety of environmental assessment tools available with the selection of the EIA for in depth treatment. It aims to help students understand what impact assessment is attempting to achieve and what constitutes a good EIA and EIS. The course will introduce participants to the fundamental principles and philosophy of EIA, including practical demonstrations for illustrative purposes. The course will expect students to reflect deeply on the limitations and key issues of EIA as it is currently practiced, and suggest creative solutions to advance the effectiveness of EIA as an environmental management tool.

Course Description

The course will begin with a general overview of the variety of environmental assessment tools currently available and an introduction to Environmental Impact Assessment (EIA) including definition, goals, objectives and purpose of EIA, definition of key terms, history of Environmental Impact Assessment and the legislative, policy and institutional framework for EIA.

It will describe the EIA process, with emphasis on biodiversity conservation and sustainable use; the development of the Terms of Reference (TOR) including screening, scoping and public participation; and the assessment of project impacts, including understanding the ecosystem, assessment of significant impacts of the project and impact management.

It will then consider reporting EIS and Environmental Management Plans, review of the EIS, linked to the TOR; and follow up monitoring, auditing, adaptive management and enforcement. Special consideration will be given to public participation, EIA standards, EIA for island, and Strategic Environmental Assessments.

Learning Outcomes

The student who successfully completes this course will be able to:

1. Understand the variety of environmental assessment tools available and their key functions
2. Describe the role and intentions of EIA in environmental management for sustainable development
3. Explain processes, principles and supporting legislation
4. Define the objectives of EIA
5. Critically assess the quality of EIA processes and EIA documents, especially TORs and EIS
6. Explain the limitations of EIA in environmental management and issues that require further development to improve the contribution of EIA to sustainable development

Mode of delivery

Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Assessment

Coursework		50%
Project	25%	
Essay	25%	
Final Examination (One two hour examination)		50%

Recommended Reading:

Authors (year)	Publication
Anon.	EIA case studies – to be provided during course
Anon.	Precautionary Principle. http://www.pprinciple.net/index.html
Ramsar Wetlands Convention 2002.	Resolution VIII.9 <i>Guidelines for incorporating biodiversity-related issues into EIA legislation and/or processes and in SEA' adopted by the CBD, and their relevance to the Ramsar Convention.</i> http://ramsar.org/res/key_res_vii_09_e.htm
Burdge, RJ 2004	<i>Concepts, process and methods of social impact assessment: Rabel J. Burdge and colleagues.</i> Social Ecology Press, Middleton, Wisconsin.
Carpenter, RA & Margos, JE 1989	<i>How to assess environmental impacts on tropical islands and coastal areas: a training manual prepared for the South Pacific Regional Environment Programme (SPREP).</i> Environment & Policy Institute, Honolulu, Hawaii
National Environment Planning Agency (NEPA)	<i>Annual Reports and State of the Environment Reports;</i> Similar reports of the respective environmental protection agencies in the respective countries.
National Environment Planning Agency (NEPA)	NEPA website http://www.nepa.gov.org Other relevant environmental protection agency websites of the various Caribbean countries.
George, C 1998	<i>Environmental assessment in Sub-Saharan Africa,</i> http://www.art.man.ac.uk/eia/nl17afri.htm
Governments of the Caribbean	<i>National Environmental Policy</i> (For example: Government of the Republic of Trinidad & Tobago (GORTT) 1998 – National Environmental Policy) <i>National Environmental Policies;</i> <i>National Environmental Action Plans</i>
Governments of the Caribbean	<i>Environmental Protection Acts</i> (For example: Government of the Republic of Guyana. 1996. <i>Environmental Protection Act 1996</i>) <i>Environmental Management Acts</i> (For example: Government of the Republic of Trinidad & Tobago 2000. <i>Environmental Management Act 2000</i>)
Governments of the Caribbean	<i>National Biodiversity Strategies</i> (For example: Government of the Republic of Trinidad & Tobago 2001. <i>National Biodiversity Strategy</i>)
Government of the Republic of Trinidad & Tobago undated.	<i>Draft CEC Rules.</i> (or other relevant rules available in the respective Caribbean countries)
Harvey, N, 2000.	Strategic Environmental Assessment in coastal zones, especially Australia's. <i>Impact Assessment and Project Appraisal (IAPA)</i> 18 (3): 225 – 232.
IAIA (International Association of Impact Assessment) 2002	Strategic Environmental Assessment Performance Criteria. <i>IAIA Special Publication Series</i> No. 1
IAIA 2005	<i>Biodiversity in Impact Assessment.</i> IAIA Special Publication Series No. 3, 4 pp.
IDB (Inter-American Development Bank) 2001	<i>Environmental Impact Assessment training the trainers' manual.</i> Washington, DC
IDB 2001	<i>Review of Environmental Impact Assessment in Selected Countries of Latin America and the Caribbean: Methodology, Results and Trends.</i> Washington, DC

- International Finance Corporation (IFC) 1998 *Doing better business through effective public consultation and disclosure: a good practice manual*. Washington, DC
- Lee, N & George, C 2000 *Environmental assessment in developing and transitional countries*. John Wiley & Sons, New York.
- Marshall, R 2001 Application of mitigation and its resolution in environmental impact assessment: an industrial perspective. *Impact Assessment and Project Appraisal (IAPA)*, **19**(3): 195 – 104.
- Pritchard, D 2005 International biodiversity-related treaties and impact assessment – how can they help each other? *Impact Assessment and Project Appraisal (IAPA)* **23**(1): 7 – 16.
- Slootweg, R; Kolhoff, A; Verheem, R & Höft, R (eds) 2006 *Background document to CBD Decision VIII/28: Voluntary guidelines on biodiversity-inclusive impact assessment*. Commission for Environmental Assessment, The Netherlands.
- UNEP 1992 *Agenda 21*
- UNEP 2004 *EIA Training Manual*
http://www.iaia.org/Non_Members/EIA/unep_main.asp
- US Council on Environmental Quality 1997 *Considering cumulative effects under NEPA Policy*.
- United Nations Environment Programme (UNEP) 1992 *The Convention on Biodiversity*.
<http://www.biodiv.org/convention/articles.asp>
- World Commission on Environment & Development (WCED) 1987 *Our Common Future*. Oxford: Oxford University Press
- OECD 2006 *Applying Strategic Environmental Assessment. Good Practice Guidance for Development Cooperation. DAC Guidelines and Reference Series*. OECD, Paris.
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ENVR6404	Principles and Practice of Geoinformatics
Credits	3
Semester	1
Course Leader:	Dr Ava Maxam
Teaching team:	Dr Ava Maxam

Aims and Distinctive Features

The aim of this course is to provide an overview of the main concepts associated with the discipline of geoinformatics. This will include an overview of the various concepts and technologies and techniques available for spatial decision making. Students will benefit significantly from this because the information provides a foundation for spatial decision-making.

Course Content

This course will provide an overview of the principles of geoinformatics including an introduction to geographic information systems, Global Positioning Systems and field survey techniques. Following an introduction to geoinformatics and definitions, the course will cover spatial data acquisition using GPS and field survey techniques, GIS data structures and capabilities. It will describe GIS and network analysis and spatial data analysis, and GIS functionality. Finally it will consider hardware and software systems and the design and implementation of GIS.

Learning Outcomes

The student who successfully completes this course will be able to:

- Examine the nature of GIS and its information technology, cartographic and geographic basis
- Explain the basic principles underpinning GIS
- Critically examine the advantages and shortcomings of the major GIS approaches and their suitability for different applications
- Discuss the main issues surrounding data requirements, quality, analysis and management

Mode of delivery

Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Assessment:

Coursework		50%
Project	25%	
Essay	25%	
Final Examination (One two hour examination)		50%

Recommended Reading:

- Aronoff, S. 1989. *Geographic Information Systems: A Management Perspective*. WDL Publications, Ottawa.
- Bernhardsen, T. (1992). *Geographic Information Systems*. Viak IT, Arendal, Norway.
- Burrough P. (1986). *Principles of Geographical Information Systems for Land Resources Assessment*. Clarendon Press, Oxford.
- Bugayevskiy, L.M. and Snyder, J.P. (1995). *Map Projections – A Reference Manual*. Taylor & Francis Ltd., London.
- Clarke, K.C. (1997). *Getting Started with GIS*. Prentice-Hall, Inc., London.
- Clarke, K.C. (1995). *Analytical and Computer Cartography*. Prentice-Hall, Inc., New Jersey.
- Eastman, J. R. (1997). *IDRISI for Windows – User’s Guide*. Clark University, Worcester.
- ESRI. Inc. (1990). *Understanding GIS – The Arc/Info Method*. ESRI, California.
- ESRI, Inc. (1996). *PC ARC/INFO Windows Extension*. ESRI, California.

- ESRI, Inc. (1998). ArcView GIS (with Spatial Analyst, Network Analyst and 3D Analyst Extensions). ESRI, California.
- Huxhold, W.E. 1991. An Introduction to Urban Geographic Information Systems. Oxford University Press, New York.
- Jensen, J.R. (1996). Introductory Digital Image Processing. Prentice-Hall, Inc., London.
- Maguire, D.J., M.F. Goodchild, D.W. Rhind. 1991. Geographical Information Systems: Principles and Applications. Longman/Wiley, New York. Vols I and II.
- Morain, Stan and Lopez Baros, Shirley (Eds.). (1996). Raster Imagery in GIS. Santa Fe, NM, OnWord Press.
- Muehrcke, P.C. and Muehrcke, J.O. (1992). Map Use – Reading, Analysis, Interpretation. 3rd Ed. JP Publications, Madison, WI.
- Tomlin, C.D. (1990). Geographic Information Systems and Cartographic Modelling. Prentice Hall, Inc. New Jersey.

ENVR6405	Management and Analysis of Environmental Data
Credits:	3
Semester:	1
Course Leader:	Dr. Kurt McLaren
Teaching Team:	Dr. Claudel Noel; Dr. N. Younger; Dr. Kisan Vaidya

Aims and Distinctive Features

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.

Course Description

This course will provide practical training in data management and in statistical analysis of environmental data. 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. 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 DISTANCE and Vortex.

Learning Outcomes

The student who successfully completes this course will be able to:

- 1 Describe the process of good experimental design in ecological studies
- 2 Select appropriate statistical analyses with which to examine various datasets
- 3 Apply appropriate parametric or non-parametric statistical analyses to data
- 4 Analyse univariate data using Minitab/ Statistix and interpret the results of such analyses
- 5 Explain the uses and application of various multivariate statistical analyses to ecological data
- 6 Summarise and present on an application of data analysis
- 7 Demonstrate the possession of group and team-working skills

Mode of delivery

Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Assessment:

Coursework		50%
Project	25%	
Essay	25%	
Final Examination (One two hour examination)		50%

Recommended Reading

Dytham, C. 2003. Choosing & Using Statistics: a Biologist's guide. Blackwell Publ. Oxford 2003, 2nd Ed. 248 pp.
 Fowler, J., L. Cohen & P. Jarvis. 1998. Practical Statistics for Field Biology. John Wiley & Sons, 2nd Edn. 259 pp.
 Wardlaw, A. C. 2000. Practical Statistics for Experimental Biologists. John Wiley & Sons, 2nd Ed. 249 pp.
 Zurr, A. F., E. N. Ieno and G. M. Smith. 2007. Analysing Ecological Data. Springer. 672 pp.

ENVR6406	Socio-ecology and Natural Resources Management
Credits:	3
Semester:	1
Course Leader:	Dr Vivienne Vassell
Teaching team:	Dr. Vivienne Vassell; Dr. Claudel Noel

Aims and Distinctive Features

The Convention on Biological Diversity expressly recognizes the importance of rural, indigenous and traditional users of biodiversity. The primary purpose of this course is to provide students with an introduction to the cultural, socio-economic and traditional beliefs, values and attitudes that affect the way rural, tribal and other indigenous users of natural resources interface with these resources. It also introduces the students to the approaches available to natural resource managers to integrate these users in sustainable management of biodiversity. The course will serve as an introduction for those students who have had little exposure to the disciplines of economics, social psychology, demography, and social organization to the issues surrounding the use of natural resources by rural and indigenous peoples.

Course Description & Structure

Successful natural resources management requires the development of consensus of all stakeholders on the goals of such management and the activities to be undertaken to achieve such goals. The need for such a consensual approach is especially important in biodiversity management situations where indigenous, tribal and rural communities have traditionally used or hold rights to access and utilization of such resources.

To enable the students to understand the context for these types of challenging resource management scenarios, the course begins by introducing current sociological thinking on the nature of, and relationships between, human values, beliefs, and attitudes to nature.

It then reviews western scientific approaches to renewable resources management in the context of traditional economically driven resource production. The students will then review through case studies regional examples of natural resources use by rural, tribal indigenous peoples and compare and contrast the bases for these interactions with western, science-based natural resources management.

Finally the students will be introduced to the basic tools currently used by natural resource managers to assess impacts on management interventions on rural and indigenous peoples, and tools for integrating these communities in resource management decision making.

Learning Outcomes

The student who successfully completes this course will be able to:

- Explain how beliefs, values and attitudes are currently understood to shape human behaviours towards natural resources.
- Describe the interrelationships between capitalism, science and western-style forestry, wildlife management and fisheries management;
- Explain and discuss, using named regional examples, the historical and current economic and cultural relationships between indigenous users and natural resources.
- Understand and describe the challenges faced by natural resource managers responsible for integrating rural and indigenous people in sustainable forestry, wildlife and fisheries management.
- Describe and understand the use of social impact assessment tools in management of natural resources utilized by rural, indigenous and traditional users of biodiversity.

Mode of delivery

Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Assessment:

Coursework		50%
Project	25%	
Essay	25%	
Final Examination (One two hour examination)		50%

Recommended Reading

Earl R. Babbie. 2009. *The Practice of Social Research*. 12th edition Wadsworth Publishing. 530 pp.

Darrell A. Posey. 1999. *Cultural and Spiritual Values of Biodiversity*. Practical Action/ United Nations Environmental Program. 731 pp.

Stephen R. Kellert. 1997. *The Value of Life: Biological Diversity and Human Society*. Island Press. 282 pp.

Edward O. Wilson. 1986. *Biophilia*. Harvard University Press.

BIOL6411 **Threats to Tropical Biodiversity**
Credits: **3**
Semester: **2**
Course Leader: **Dr. Mona Webber**
Teaching Team: **Dr. Mona Webber; Dr. Eric Hyslop; Dr. Dayne Buddo**

Aims and Distinctive Features

This course will provide student with a detailed appreciation of the main threats facing global biodiversity and particularly tropical biodiversity. It will describe the critical processes impacting a variety of tropical systems and explore the underlying pressures on these ecosystems while providing the fundamental framework and concerns which underpin and drive current environmental management practices.

Course Description

This course will examine the major threats to tropical biodiversity and ecosystems. It will highlight the major threats, as described in the CBD: habitat loss and degradation, over-exploitation, climate change, pollution and introduction of alien species. It will also examine the history of human intervention in tropical environments.

In 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 considered.

Using examples, and case studies, major threats will be considered in relation to the impacts being seen on selected ecosystems. 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 global warming, impacts on species and ecosystems and methods for the detection of climate change will be described.

Learning Outcomes

The student who successfully completes this course will be able to:

1. Discuss the principle threats confronting global biodiversity and tropical diversity
2. Explain the impact and consequence of these threats to a variety of tropical ecosystems
3. Describe the major underlying pressures which drive the main threats to tropical biodiversity
4. Compare and contrast the major threat to particular tropical ecosystems
5. Summarise and present on topics relevant to the threats to tropical biodiversity
6. Demonstrate the critical analysis of scientific information and literature

Mode of delivery

Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Assessment

Coursework		50%
Project	25%	
Essay	25%	
Final Examination (One two hour examination)		50%

Recommended Reading

Much of the information for this course will come from the primary literature. However, a number of texts form a framework around which some of the information is structured. These include:

Groom, M. J., G. K. Meffe, and C. R. Carroll. 2006. *Principles of Conservation Biology*. 3rd ed. Sinauer Associates, Sunderland, MA. 779 pp.

Osborne, P. L. Ch. 7. Wetlands and succession, pp. 221 – 237; Ch. 6. Rivers, floodplains and estuaries, 6.3.4 The floodplain, pp. 202 – 206; and 6.3.5 Flooded forests, p. 206. 2000. *Tropical Ecosystems and Ecological Concepts*. Cambridge University Press. 464 pp. [QH84.5 .O82 2000](#)

Primack, R.B. 2010. *Essentials of conservation biology*. 5th Ed. Sinauer Associates, Sunderland, MA. 535pp.

Secretariat of the Convention on biological Diversity. 2010. *Global Biodiversity Outlook 3*. Montreal, 94 pp.

BIOL6412	Conservation & Management of Biodiversity
Credits:	3
Semester:	2
Course Leader:	Dr Byron Wilson
Teaching Team:	Dr Byron Wilson; Dr. Kurt McLaren; Dr. Judith Mendes

Aims and Distinctive Features

This course will provide an advanced and detailed review of the theoretical basis for conservation practice and review issues relevant to tropical biodiversity conservation. It is structured to provide the critical biological underpinning for other courses in the MSc programme.

Course Description

This course will provide students with a detailed review of the key elements of ecology and biology that are relevant to understanding the context, threats and current approaches to conservation of biological diversity. It takes an approach that ranges in scale from the molecular to ecosystem, and includes elements of demography and population dynamics (particularly of small populations), landscape ecology, measurement of biological diversity, and ecosystem patterns and processes. It also includes a brief introduction to the historical and socio-economic factors leading to the current anthropogenic biodiversity crisis, and outlines the range of approaches currently taken by conservation biologists to address these threats. This will be placed in the context of international treaties including the Convention on Biological Diversity.

The molecular genetic component of the course will cover such topics as: concepts of molecular genetics, intra-specific variation, inter and intra-specific genetic diversity, processes of evolution, allopatric and sympatric speciation. Overviews will be given of modern molecular methods for detection of genetic species/ heterozygosity. The importance of intra-specific heterozygosity will be highlighted in relation to current understanding of evolution and adaptation, with specific reference to the Caribbean.

It will define species diversity, explore the cline in diversity between the tropics and the poles, and define concepts such as endemism and keystone species. The exploration of these concepts will be used as a segue to identification of the unique elements of continental and insular Caribbean biodiversity, and to introduce students to the processes that maintain diversity of different ecosystems in the region.

The course will describe the important tropical ecosystems including forest, savannah, riverine, lake, wetland, mangrove and coastal systems including coral reefs of the region. In each case the systems will be considered holistically in relation to their diversity, ecology, ecosystem function, goods and services.

Learning Outcomes

The student who successfully completes this course will be able to:

1. Describe and demonstrate an understanding of the underlying population biology and key genetic and molecular biology issues of importance to conservation science;
2. Explain the energetic, nutrients and ecosystem level patterns and processes found in Neotropical ecosystems;
3. Describe and discuss the methods used to select, design and manage protected natural areas, and the discuss their importance as tools for biodiversity conservation;
4. Discuss the role of human communities in protected areas management and sustainable natural resource use;

5. Demonstrate an understanding of the approaches used in coastal, marine and freshwater protected areas management
6. Demonstrate an understanding of the tools and techniques used in *ex situ* conservation and ecological restoration

Mode of delivery

Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Assessment

Coursework		50%
Project	25%	
Essay	25%	
Final Examination (One two hour examination)		50%

Recommended Reading

Much of the information presented in these lectures will come from the primary literature and electronic journal based information. However, a number of text books provide a framework within which the concepts being described are considered. These include:

Johnson, T. H. 1988. Biodiversity and Conservation in the Caribbean. International Council for Bird Preservation, Cambridge. 1988.

Groom, M. J., G. K. Meffe, and C. R. Carroll. 2006. Principles of Conservation Biology. 3rd ed. Sinauer Associates, Sunderland, MA. 779 pp.

Osborne, P. L. Ch. 7. Wetlands and succession, pp. 221 – 237; Ch. 6. Rivers, floodplains and estuaries, 6.3.4 The floodplain, pp. 202 – 206; and 6.3.5 Flooded forests, p. 206. 2000. *Tropical Ecosystems and Ecological Concepts*. Cambridge University Press. 464 pp. [QH84.5 .O82 2000](#)

Primack, R.B. 2010. Essentials of conservation biology. 5th Ed. Sinauer Associates, Sunderland, MA. 535pp.

Secretariat of the Convention on biological Diversity. 2010. Global Biodiversity Outlook 3. Montreal, 94 pp.

BIOL6413	Sustainable Use and Management of Natural Resources
Credits:	3
Semester:	2
Course Leader:	Dr. David Smith
Teaching Team:	Dr. David Smith; Dr. Karl Aiken

Aims and Distinctive Features

The aim of this course is to familiarize students with contemporary issues regarding sustainable use of tropical resources and sustainable development. The mainstreaming of biodiversity within development is a priority for the Conference of the Parties of the Convention on Biological Diversity (CBD) and this course will explore some of the key issues and problems associated with this process. It will introduce students to renewable ecosystem-based industries and the environmental issues historically associated with their operation and consider what is required of these sectors as they move toward sustainability.

Course Description

This course will address important tropical ecosystem based industries including forestry, agriculture, fisheries, energy, the pharmaceutical industry and tourism. In order to be sustainable, these industries will have to adopt environmental activities as core to their business, rather than consider them as an overhead. Topics covered in this course will include an analysis and determination of land capability and optimal land use. Social aspects of land use and land degradation, together with the need for participatory approaches in sustainable development, will be discussed. The need for the integration of soil and water conservation into farming systems, integrating water needs in agriculture with industrial and potable supply requirements.

Agro-ecological systems will be considered in relation to sustainable mono-cropping, multiple cropping and agro-forestry systems for tropical environments. Sustainable forestry and timber production will also be examined. The need for development and exploitation of alternative energy sources including solar energy, hydroelectric, wind power, turbines and farms, wave power, deep water wave devices will also be considered in response to anticipated climate change issues.

Finally, current issues of fishery management will be examined as countries try to achieve sustainability in tropical capture fisheries, including management of freshwater environments for fisheries production, the integration of aquaculture production systems into agricultural and water conservation practices.

Learning Outcomes

The student who successfully completes this course will be able to:

1. Explain the underlying concepts for sustainable use of natural resources;
2. Describe the properties of Neotropical soils and how these properties affect sustainable land-use, water conservation and land capability;
3. Explain the characteristics of Neotropical agro-ecological and agro-forestry systems and discuss the properties of sustainable models for such systems
4. Demonstrate an appreciation of the techniques and principles associated with sustainable timber, NTFP, wildlife, and capture fisheries management, and the role of these management strategies in carbon sequestration (soil based & REDD+).
5. Describe the current status of development and exploitation of biodiversity-based sources of renewable energy in the wider Caribbean, including biofuels;
6. Discuss the role of aquaculture in sustainability of marine and freshwater fisheries;
7. Explain the role of ecotourism and other non-consumptive uses of biodiversity in achieving sustainable use of

Mode of delivery

Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Assessment

Coursework		50%
Project	25%	
Essay	25%	
Final Examination (One two hour examination)		50%

Recommended Reading

- Berkes, F., R. Mahon, P. McConney. 2001. Managing small-scale fisheries: alternative directions and methods. IDRC. 309 pp.
- Brady, N. C. and R.R. Weil. 2002. The Nature and Properties of Soils. 13th Edition.
- Chazdon, RL and Whitmore TC. Foundations of tropical forest biology: Classic papers with commentaries. University of Chicago Press. 862 pp.
- FAO. 2006. The State of World Fisheries and Aquaculture. 162 pp.
- Johnson, D. and L.A. Lewis. 2007. Land Degradation: Creation and Destruction. Lanham, MD: Rowman & Littlefield. 2nd edition. 303 pp.
- M. Kellman, M. and R. Tackaberry. 1997. Tropical Environments: the Functioning and Management of Tropical Ecosystems. London: Routledge. 380 pp.
- King, M. 2007. Fisheries Biology, Assessment and Management. Blackwell Pub. 2nd ed. 382 pp.
- Lal, R. 1995. Sustainable management of soil resources in the humid tropics. United Nations University Press Tokyo • New York • Paris. 146 pp.
- Pitcher, T.J., & P.J.B. Hart. 1982. Fisheries Ecology. Springer.
- Pitcher, T.J., P.J.B Hart, & D. Pauly. 1999. Reinventing Fisheries Management. Kluwer Academic Publ. 435 pp.
- Robinson, J., Boundas, E and Bennett, E. 1999. Hunting for sustainability in Tropical Forests. Columbia University Press, 1000 pp.
- Webster, C. C. and P.N. Wilson (eds). 1998. Agriculture in the Tropics. Oxford: Blackwell. 3rd edition.
- Webster, C. C. and P.N. Wilson (eds) (1998). Agriculture in the Tropics. Oxford: Blackwell (third edition).

BIOL6414 **Integrated Coastal Zone Management.**
Credits: **3**
Semester: **2**
Course Leader **Professor Dale Webber**
Teaching Team: **Professor Dale Webber; Dr. Kwame Emanuel; Dr. Alicia Hayman**

Aims and Distinctive Features

- To promote best practices in the field of integrated coastal management in order to address environmental issues and conflicts associated with exploitation of coastal resources.
- To facilitate the application of social analysis, economic evaluation, EIA, GIS and alternative dispute resolution techniques to resolve coastal issues.
- To analyse the composition of stakeholders involved in any issue and evaluate the coastal resources management in the region towards the formulation of a regional strategy for ICM.

Learning Outcomes

On successful completion of the course, students will be able to:

1. Articulate basic concepts in ICM
2. Discuss international agreements and global issues related to ICM
3. Describe institutional arrangements in ICM
4. Describe the Caribbean coastal environment and the tools and processes applied in ICM
5. Articulate the major coastal problems in the Caribbean
6. Describe regional management regime and policies in operation in the Caribbean.

Course Description:

- Integrated coastal management concepts and practices
- Instructional arrangements in integrated coastal management
- Economic valuation
- Environmental Impact Assessment and Strategic Environmental Assessments
- Social Analysis
- The Caribbean Coastal Environment
- Major coastal problems in the Caribbean
- Integrated Coastal Management in the Caribbean Region
- Integrated Coastal Management Studies in the Caribbean

Practical exercises will be conducted on the above mentioned topics

Mode of delivery

Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Assessment

Coursework		50%
Project	25%	
Essay	25%	
Final Examination (One two hour examination)		50%

Recommended Reading:

Material will be constantly updated with students being provided with current readings from relevant journals and being encouraged to make use of e-journals and international databases such as Science Direct and Web of Science.

- Burdge, R.J. 2004 *Concepts, process and methods of social impact assessment: Rabel J. Burdge and colleagues*. Social Ecology Press, Middleton, Wisconsin.
- Cicin-Sain, Biliana and Knecht, Robert W. 2004. *Integrated Coastal and Ocean Management; Concepts and Practices*. Island Press. 517 pp.
- IAIA (International Association of Impact Assessment) 2005 *Biodiversity in Impact Assessment*. IAIA Special Publication Series No. 3, 4 pp.
- Lee, N. & George, C. 2000 *Environmental assessment in developing and transitional countries*. John Wiley & Sons, New York.
- Ramlogan, R. and Persadie, N. 2004. *The Developing World and the Environment: Making the Case for Effective Protection of the Global Environment (2004: University Press of America, Maryland)*.
- Silvester, Richard & Hsu, John R.C. 2001. *Coastal Stabilisation; Innovative Concepts*. Prentice Hall. 169 pp.

BIOL6415 **Natural Resources and Project Management for Environmental Education**
Credits: **3**
Semester: **2**
Course Leader **Dr. Eric Garraway**
Teaching Team: **Dr. Eric Garraway; Dr. Chandra Deiga**

Aims and Distinctive Features

Biodiversity represents a fundamental resource for education and recreation. The biologist serves as a mediator interpreting the biological features of students and visitors. The course aims at introducing effective means of communication and interpretation.

Learning Outcomes

Upon successful completion of this course the student will be able to:

1. Evaluate methods of public relations in natural resources management.
2. Develop information material using multiple media to interpret natural resources.
3. Design and implement interpretative facilities.

Course Description:

Natural Resources Public Relations:

- methods of disseminating public information;
- planning outreach programmes;
- public involvement methods.

Interpretive Media Development: written and graphic media

- Including brochures, posters and signs; slide shows and videos;
- interactive media using electronic technologies.

Interpretive Facilities Planning:

- exhibitions; visitor centres; nature trails.

Mode of delivery

Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Assessment

Interpretive media project	50%
Multimedia presentation	20%
Coursework	30%

Recommended Reading

Material will be constantly updated with students being provided with current readings from relevant journals and being encouraged to make use of e-journals and international databases such as Science Direct and Web of Science.

Fazio, J.R., D.L. Gilbert and D. Gilber 2000. Public relations and communication for natural resources managers. 3rd ed. ISBN 0787269743. (US\$50)

International Finance Corporation (IFC) 1998 *Doing better business through effective public consultation and disclosure: a good practice manual.*

World Commission on Environment and Development (WCED or Brundtland Commission) 1987 *Our Common Future.* Oxford: Oxford University Press.

ENVR6407	Environmental Economics
Credits:	3
Semester:	2
Course Leader:	Professor Claremont Kirton
Teaching Team:	Professor Claremont Kirton; Dr. Hopeton Peterson

Aims and Distinctive Features

The primary purpose of this course is to provide students with an introduction to environmental and natural resource economics. The secondary purpose is to give students insight into how economists think about the environment and how they approach environmental problems. It will provide an introduction to economic value of environmental assets and costs of environmental problems. It will provide students with the basic theory in environmental and natural resource economics and how this underpins environmental management policy and decision making.

Course Structure

The course will begin by introducing basic economic principles and exploring the limits of human nature in dealing with environmental degradation. It will then consider environmental economics from several perspectives; examine various economic tools and discuss their limitations. Using examples, it will then apply these tools to everyday scenarios that illustrate the possibilities and limitations of economics in resolving environmental and natural resource issues.

Learning Outcomes

The student who successfully completes this course will be able to:

1. Define and describe key concepts in environmental economics.
2. Empirically solve problems of natural resource distribution.
3. Evaluate the feasibility of policies and their theoretical expected outcomes for solving environmental problems, in a Caribbean context.
4. Differentiate and defend the choice of policies to solve specific environmental problems
5. Demonstrate the critical analysis of academic information and literature

Mode of delivery

Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Assessment

Coursework	50%
Project	20%
Essays	30%
Final Examination(One two hour examination)	50%

Recommended Reading

- Field, Barry C. and M. Field. 2002. Environmental Economics: An Introduction. 3rd Ed. McGraw Hill, New York. 510 pp.
- Hackett, Steven C. 2006. Environmental and Natural Resource Economics. 3rd Edition. 524 pp.
- Kellman, Martin and Rosanne Tackaberry. 1997. Tropical Environments: The Functioning and Management of Tropical Ecosystem. Routledge, New York. 330 pp.
- Pearce, David W. and R. Kerry Turner. 1990. Economics of Natural Resources and the Environment. The John Hopkins University Press: Baltimore
- Tietenberg, Thomas H. and L. Lewis. 2009. Environmental Economics and Policy. 6th Ed. Addison Wesley Longman, Inc.: Boston, Massachusetts. 536 pp. [REQUIRED TEXT]
- Tietenberg, Thomas H.. and L. Lewis, 2009. Environmental and Natural Resource Economics. 8th Ed. Addison Wesley Longman, Inc.: Boston, Massachusetts. 660 pp.
- Young, Oran R. 1997. Global Governance: Drawing Insights from the Environmental Experience, MIT. 364 pp.

ENVR6500	Research Project
Credits:	9
Semester:	3 (12 weeks commencing in the Summer)
Course Leader:	Dr. Karl Aiken
Course Team:	All Staff

Aim

To plan and carry out a research project on a topic relevant to the MSc specialization.

Objectives

Upon successful completion of this course students will be able to:

1. Identify research needs within a chosen field
2. Plan and carry out a research project answering identified needs.

Syllabus

The research programme will be identified by a qualified supervisor.

Assessment Strategy

Oral Presentation of Research Project	25%
Research Paper (15,000 word maximum)	75%

Recommended reading:

Leedy, P.D. and J.E. Ormrod, 2007. 8th Ed. Practical research: planning & design. Prentice Hall College Division. ISBN 0139603603. US\$ 56.

Ling Pan, M. 2010. Preparing Literature Reviews: Qualitative And Quantitative Approaches

BIOL6550	Environmental Research Project
Credits:	12
Semester:	3 & 4 (20 weeks commencing in the Summer)
Course Leader:	Dr. MonaWebber
Course Team:	All Staff

Aims and distinctive features

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 will provide 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.

Course Description

A Research Project is a fundamental component of the MSc programme and this is reflected, not only in the credit weighting, but by the fact that this MSc runs for an extra 3 months so that the student may have the necessary time to complete the project to a high standard.

Students will come to the Course Leader during the first semester of the MSc with potential ideas for their research project. A list of potential projects will also be made available for those students who do not have a specific topic in mind. During the first two semesters, the student and course leader will meet, at least twice, 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 toward a fundamental aspect of tropical biodiversity or address more applied issues. It may involve field or laboratory based work or may be a desk study involving data analysis or interrogation of legal documents. It may underpin studies being undertaken by staff within UWI or it may address an issue related to a student's employer.

The project should, however, give the student a chance to further develop skills from the toolbox and a more detailed understanding of some component of the course.

Learning Outcomes

The student who successfully completes the Research Project will:

1. Demonstrate an advanced knowledge and understanding of a practical or technical aspect of environmental monitoring or management of tropical biodiversity
2. Demonstrate knowledge and understanding of the underlying philosophies to project preparation and reporting
3. Demonstrate an ability to analyse scientific information and literature critically
4. Summarise and present on a topic relevant to an aspect of tropical biodiversity
5. Demonstrate the possession of skills in self-management
6. Demonstrate the possession of skills in numerical techniques
8. Demonstrate the possession of oral presentation skills

Teaching Strategy

Learning will take place through the completion of a research project which will be supervised and facilitated by a member of the academic team. It will involve the completion of the equivalent of 6 months research followed by the preparation of a draft research paper and research thesis. The success of the project will, therefore, depend on the commitment of the student and the demonstration of good project management and time management skills by the individual.

Assessment Strategy

Oral Presentation of Research Project	30%
Research Paper (15,000 word maximum)	70%

Recommended Reading

As required for each individual research project

Beynon, R. J. (1993) Postgraduate Study in the Biological Sciences –A Researcher’s Companion. Portland Press, London.
ISBN 1 85578 009 7

Briscoe, M.H. (1996) Preparing Scientific Illustrations – A Guide to Better Poster, Presentations and Publications.
Springer-Verlag New York, Inc. ISBN 0 387 94581 4