The School for Field Studies

Center for Marine Resource Studies

South Caicos, Turks & Caicos Islands,
British West Indies

BI/EE (NS) 373: TROPICAL MARINE ECOLOGY

SYLLABUS FOR SPRING 2009

FACULTY

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1. COURSE OVERVIEW

Tropical marine ecology deals with the interactions of living and non living components of tropical marine environments and how these shape/form different ecosystems. This course focuses on the benthic and neritic environments from the intertidal areas of South Caicos to its shelf edge, with emphasis on seagrass, mangrove and coral reef ecosystems. Basic ecological principles will be used to explain the interdependencies of species, populations, communities and ecosystems.

2. LEARNING OBJECTIVES

After completing this course, students should:

1. Be able to identify most common marine organisms and habitats of South Caicos, and understand their roles in the coastal ecosystem and the fishery of the Turks & Caicos Islands.

2. Understand the importance of various ecological processes in coral reef, mangrove and seagrass ecosystems.
3. Understand the biology and ecology of the species targeted in the South Caicos fisheries
4. Understand the ecological concepts important in planning and managing MPAs.
5. Be familiar with a range of sampling techniques used in tropical marine research.

3. CASE STUDIES

During the semester, we will use two case studies to frame our analysis and discussions, each of which addresses specific local issues:

Case Study I: The status of the marine resources that are currently considered important to the ecological and socioeconomic well being of the TCI.

Case Study II: Management strategies that assist in maintaining or improving the status of the marine resources in the TCI and contribute to future economic development and diversification.

The focus of **Case Study I** is on identifying organisms, understanding their biology, ecology and roles in mangrove, seagrass and coral reef ecosystems, with an emphasis on their context within the Turks and Caicos Islands. In **Case Study II** we focus on the ecological principles behind the use of MPAs as management tools.

4. ASSESSMENT

Assessment Item	Due date	Value (%)
Field Identification		
Seagrass and Mangroves	Thursday 12th Feb	10
Reef Fishes	Monday 2nd March	10
Corals and Reef Invertebrates	Tuesday 2nd April	10
Field Exercises: Introduction to sampling techniques	Thursday 31st March	15
Exams		
Case study I Final Exam	Saturday 7th March	30
Case study II Final Exam	Tuesday 7th April	15
Positive contribution to course	Ongoing	5
Quizzes	Ongoing	5
TOTAL		100

Lectures & discussions are held at the Center. It is mandatory to attend all lectures. Prior to each lecture, students are required to read the course reading(s) designated for that lecture. Short quizzes will be given on required readings throughout the course at the course supervisor's discretion.

Field ID sessions – Students will learn to identify a number of organisms. These organisms are split into three groups: (1) organisms found in mangrove and seagrass habitats, (2) coral reef fishes, and (3) corals and invertebrates. Teaching involves an introductory slideshow followed by sessions in the field in small groups supervised by the course supervisor and the interns. However, learning is entirely the responsibility of the student: Powerpoint slideshows and field ID notes are provided in the course materials and a number of different ID books are available in the computer room. The field sessions allow students to associate the organisms they have learnt with certain behaviours, movements and (micro)habitats as well as becoming familiar with their relative sizes.

Laboratory sessions take place in the kitchen or at the dock and involve dissecting conch. Any students not wishing to dissect organisms for conscientious reasons should discuss this with the course supervisor as soon as possible.

Field exercise – an introduction to field techniques
There are two main objectives to the field exercise:

(1) to introduce students to a range of field techniques
(2) to enhance students' appreciation of the need to tailor/design sampling techniques to suit both the organisms/systems being studied and the specific research questions being asked

The field techniques include belt transects, line intercept transects, timed swims, quadrats, point counts and behavioural observations (techniques may change due to weather, time, and other logistical considerations). Each student will be given the opportunity to use every technique twice. Complete details of the graded assignments will be issued in a separate document.

Exams are given after each Case study and are based on all aspects of the course – lectures, field IDs, field exercises and labs – during that Case study.

Positive contribution to course - A student's learning experience is not only determined by the course SFS delivers, but a large proportion is determined by his/her attitude to learning and that of his/her peers. Students are encouraged to be actively involved in their learning experience and that of their fellow students. In order to reward behaviour that enhances the learning environment, 5% of the final grade is allocated to the positive contribution that students make during the course. Positive contributions include stimulating discussion in class, asking/answering relevant questions, being helpful during field exercises and labs, and punctuality.

5. GRADING SCHEME

A	92.50 - 100%	B	+87.50 - 89.99%	C+	77.50 - 79.99%	D	60.00 - 69.99%
A-	90.00 - 92.49%	B	82.50 - 87.49%	C	72.50 - 77.49%	F	<60.00%
		B-	80.00 - 82.49%	C-	70.00 - 72.49%		

6. GENERAL REMINDERS

Readings - You are expected to have read all the assigned articles prior to each class. All readings are available as PDFs on the Student Drive.

Plagiarism - Using the ideas and material of others without giving due credit, is cheating and will not be tolerated. A grade of zero will be assigned if anyone is caught cheating or aiding another person to cheat actively or passively (e.g., allowing someone to look at your exam). All assignments unless specifically stated should be individual pieces of work.

Deadlines
Deadlines for written and oral assignments are instated for several reasons:

1. Deadlines are a part of working life to which students need to become accustomed
2. Deadlines promote equity among students
3. Deadlines allow faculty ample time to review and return assignments before others are due.

As such, deadlines are firm and extensions will only be considered under the most extreme circumstances. Late assignments will incur a 10% penalty for each hour that they are late. This means an assignment that is five minutes late will have 10% removed, an assignment that is one hour and five minutes late will have 20% removed etc. Assignments will be handed back to students after a one-week grading period.

Participation

Since we offer a program that is likely more intensive than you might be used to at your home institution, missing even one lecture can have a proportionally greater effect on your final grade simply because there is little room to make up for lost time. Participation in all components of the program is mandatory because your actions can significantly affect the experience you and your classmates have while at CMRS. Therefore, it is important that you are prompt for all land and water based activities, bring the necessary equipment for field exercises and directed research, and simply get involved.

7. LECTURES

Code	Titles of Lectures /Field Exercises	Type	Time (hr:min)
ME01	Introduction to Course and Marine Ecosystems of the TCI	L	1:00
ME02	Seagrass and Mangroves ID Slideshow	L	1:00
ME03	Seagrass Ecology	L	1:00
ME04	Seagrass and Mangroves ID Field I	FEX	2:30
ME05	Mangrove Ecology	L	1:00
ME06	Seagrass and Mangroves ID Field II	FEX	2:30
ME07	Seagrass and Mangroves ID Field III	FEX	2:30
ME08	Seagrass and Mangroves ID Field Exam	FT	2:00
ME09	Biology and Ecology of Conch	L	1:00
ME10	Conch lab	Lab	1:00
ME11	Fish ID Slideshow	L	1:00
ME12	Biology and Ecology of Spiny Lobster	L	1:00
ME13	Biology and Ecology of Reef Fishes	L	1:00
ME14	Reef Fishes ID Field I	FEX	2:00
ME15	Reef Fishes ID Field II	FEX	2:00
ME16	Reproductive Biology of Reef Fishes & Spawning Aggregations	L	1:00
ME17	Reef Fishes ID Field III	FEX	2:00
ME18	Coral Biology	L	1:00
ME19	Field techniques I (transects)	L	1:00
ME20	Field Exercise I	FEX	2:30
ME21	Reef Fishes ID Field Exam	FT	2:00
ME22	Ecology of Coral Reefs	L	1:00
ME23	Field techniques II (quadrats)	L	1:00
ME24	Field Exercise II	FEX	2:30
ME25	Coral & Reef Invertebrate ID Slideshow	L	1:00
ME26	Coral ID Field I	FEX	2:30
ME27	Coral ID Field II	FEX	2:30

ME28	Coral ID Field III	FEX	2:30
ME29	Coral ID Field Exam	FT	2:00
ME30	Ecological Concepts of MPAs	L	1:00
ME31	Field techniques III (behavioural)	L	1:00
ME32	Field Exercise III	FEX	2:30
ME33	Field techniques presentations	D	2:00
ME34	Interactions – Corals/Seagrass/Mangroves	L	1:00
	Case Study I Exam	T	
	Case Study II Exam	T	
	Total hours		**54:30**

L: Lecture, D: Discussion, FL: Field Lecture, FEX: Field Exercise, T: Test, FT: Field Test

8. Lecture Topics, Descriptions and Required Readings

Number	Lecture Title and Description	Readings
	Case study I	
ME01	**Introduction to ME course and to Marine Ecosystems of South Caicos** • Course overview • Overview of the main ecosystems of South Caicos: Seagrass, Mangroves and Coral reefs • Oceanographic factors that determine their distribution • Brief description of bipartite life cycle of marine organisms	None
ME02	**Seagrass & Mangroves ID Slideshow** Introductory slideshow and field identification of the common seagrasses and mangroves and associated creatures of the TCI No set readings, but a selection of ID books can be found in computer room and MS word and Powerpoint documents with all the organisms to be learnt are on the student drive.	Books: Humann P (1996) Reef coral identification; Florida, Caribbean, Bahamas. New World Publications, Jacksonville, FL. Kaplan EH (1988) A field guide to South eastern and Caribbean seashores. Peterson Field Guide Series. Houghton Mifflin Company, Boston.
ME03	**Seagrass Ecology** An in-depth coverage of seagrass, including: • Environmental requirements of seagrass • Growth and productivity of seagrass • Ecological succession in seagrass • Role of seagrass as juvenile habitat	Zieman JC (1982) The ecology of the seagrasses of South Florida: a community profile. U.S. Fish and Wildlife Services, Office of Biological Services, Washington, D.C. **Chapters 4 and 5 only**
ME04,06, 07	**Seagrass & Mangroves ID Field Sessions I,II &III** Instructor led sessions snorkelling and walking at different sites, learning field IDs	See ME02
ME05	**Mangrove Ecology** An in-depth coverage of mangrove forests, including: • Environmental requirements of mangroves • Growth and productivity of mangroves • Ecological succession in mangroves • Role of mangroves as a juvenile habitat	Rützler K, Feller C (1987) Mangrove swamp communities. Oceanus 30:16-24
ME08	**Seagrass & Mangroves ID Test** A test of 20 randomly chosen organisms conducted in the field on snorkel and walking	See ME02

ME09	**Biology and Ecology of Conch** Conch are one of the two the major fisheries in the Turks & Caicos Islands. This lecture will cover: • Life history (there are several distinct stages) • Growth and reproductive biology	Tewfik A (1995) Life history, ecology, fisheries, stock status and management measures of the Queen conch, *Strombus gigas*. Caricom fisheries resource assessment and management plan. p 2-12
ME10	**Conch Biology Lab** Dissection of conch	None
ME11	**Reef fishes ID Slideshow** Introductory slideshow and field identification of the reef fishes of the TCI No set readings, but a selection of ID books can be found in computer room and MS word and Powerpoint documents with all the organisms to be learnt are on the student drive.	Book: Humann P (1996) Reef fish identification; Florida, Caribbean, Bahamas. New World Publications, Jacksonville, FL.
ME12	**Biology and Ecology of Spiny Lobster** Spiny lobsters are one of the two the major fisheries in the Turks & Caicos Islands. This lecture will cover: • Life history (there are several distinct stages) • Growth and reproductive biology	Lipcius RN, Cobb JS (1994) Ecology and fishery biology of Spiny Lobsters. In: Phillips BF, Cobb JS, Kittaka J (Eds.). Spiny Lobster Management. Blackwell Scientific Publications, London, p. 1-30
ME13	**Biology and Ecology of Tropical Marine Fishes** An overview of the marine fishes of the Turks & Caicos Islands, with special emphasis on: • Morphology • Behaviour • Feeding ecology	Choat JH, Bellwood DR (1991) Reef fishes: their history and evolution In: Sale PF (Ed.) The ecology of fishes on coral reefs. Academic Press, San Diego, CA, **p 39-53 only**.
ME14,15, 17	**Reef fishes ID Field Sessions I,II & III** Instructor led sessions snorkelling at different sites, learning field IDs	See ME11
ME16	**Reproductive Biology of Reef Fishes & Spawning Aggregations** • Costs & benefits of reproductive strategies • Spawning aggregations	Deloach N, Humann P (1999) Reef fish behavior. New World Publications Inc. Jacksonville, Florida.
ME18	**Biology of Corals** The first of two lectures on coral reefs, covering basic biology of hard and soft corals: • Taxonomy and general life history of corals • Structure, function and physiology	Castro P, Huber ME (2005) Coral reefs In: Marine biology. 5th Edition William C. Brown Publishers, Dubuque, IA, p 285-309.
ME19	**Introduction to field techniques I** Background to field techniques Transects	
ME20,24 32	**Introduction to field techniques: Fieldwork Sessions I, II & II** Three full afternoons in the field gathering data using different techniques	None
ME21	**Reef fishes ID Test** A test of 20 randomly chosen fishes conducted in the field on snorkel	See ME11
ME22	**Ecology of Coral Reefs** The second lecture on coral reefs covers the ecology of reefs as an ecosystem, in particular: • Reef, growth, structure and zonation • Structure of coral reef communities • Ecological and physical processes important to coral reef ecosystems • The tragedy of Jamaica's reefs as a case study	Castro P, Huber ME (2005) Coral reefs In: Marine biology. 5th Edition William C. Brown Publishers, Dubuque, IA, p 285-309.
ME23	**Introduction to field techniques II** Quadrats	None

ME25	**Corals & Reef Invertebrates ID Slideshow** Introductory slideshow and field identification of the common corals and reef invertebrates of the TCI. No set readings, but a selection of ID books can be found in computer room and MS word and Powerpoint documents with all the organisms to be learnt are on the student drive.	Books: Humann P (1996) Reef coral identification; Florida, Caribbean, Bahamas. New World Publications, Jacksonville, FL. Humann P (1996) Reef creature identification; Florida, Caribbean, Bahamas. New World Publications, Jacksonville, FL.
ME26,27, 28	**Corals & Reef Invertebrates ID Field Sessions I,II & III** Instructor led sessions snorkelling at different sites, learning field IDs	See ME25
ME29	**Corals & Reef Invertebrates ID Test** A test of 20 randomly chosen organisms conducted in the field on snorkel	See ME20
	Case study II	
ME30	**Ecological Concepts of MPAs** Marine protected areas are considered by some to be the best way to manage multispecies reef fisheries in developing island nations. This lecture examines: The effects of protective management on exploited stocks The role of larval dispersal/transport in MPA planning The role of foraging and spawning migrations in MPA planning	Russ GR (2002) Yet another review of marine reserves as reef fishery management tools. In: Sale PF (ed) Coral reef fishes. Academic Press, San Diego, California pp 421-445
ME31	**Introduction to field techniques III** Behavioural observations	None
ME33	**Introduction to field techniques: Field Exercise Presentations** Discussion of techniques: what sort of data they can be used to collect, potential applications (research questions, species and environments), shortcomings, benefits, improvements. Group project proposals.	None
ME34	**Seagrass, Mangrove, and Coral Reef Interactions** Tropical coastal ecosystems are closely linked together. This lecture discusses the interdependence between coastal ecosystems, including: Physical interactions between reefs, seagrass beds and mangroves Trophic linkages and energy flow\ Nursery habitats	UNESCO. (1983) Coral reefs, seagrass beds, and mangroves: Their interaction in the coastal zones of the Caribbean. Report of a workshop held at West Indies Lab, St. Croix, USVI, May 1982. UNESCO Reports in Marine Science 23:**6-17 only**