



AMERICAN UNIVERSITY OF BEIRUT
Faculty of Arts & Sciences
Department of Biology

Course: Marine Ecology (Biol 255; 3.0; 3cr.)

Instructor: Dr. Michel Bariche

Office: Room 105, Biology bldg.

Textbook: Castro P., Huber M.E., 2008. Marine Biology (8th edition). McGraw-Hill.

COURSE DESCRIPTION

This course introduces the ecology of marine and brackish water ecosystems, structures and processes, with special attention to the eastern Mediterranean Sea. Interrelationships among animals, plants, chemical and physical aspects of the environment are studied, as well as the unique adaptations for survival in these habitats.

COURSE CONTENTS

Tentative syllabus

AN INTRODUCTION TO MARINE ECOLOGY

- The organization of communities
 - How populations grow
 - Ways that species interact
- Major marine lifestyles and environments
- The flow of energy and materials
 - Trophic structure
 - Cycles of essential nutrients

BETWEEN THE TIDES

- Rocky shore intertidal communities
 - Exposure at low tide
 - The power of the sea
 - The battle for space
 - Vertical zonation of rocky shores
- Soft-bottom intertidal communities
 - The shifting sediments
 - Living in the sediment

ESTUARIES

- Origins and types of estuaries
- Physical characteristics of estuaries
 - Salinity
 - Substrate
 - Other physical factors
- Estuaries as ecosystems
 - Living in an estuary
 - Types of estuarine communities
 - Feeding interactions among estuarine organisms
- Human impact on estuaries communities

LIFE ON THE CONTINENTAL SHELF

- Physical characteristics of the subtidal environment
- Continental shelf bottom communities
 - Soft-bottom subtidal communities
 - Hard-bottom subtidal communities

CORAL REEFS

The organisms that build reefs

Reef corals

Other reef builders

Conditions for reef growth

Kinds of coral reefs

Fringing reefs

Barrier reefs

Atolls

The ecology of coral reefs

The trophic structure of coral reefs

Coral reef communities

LIFE NEAR THE SURFACE

The organisms of the epipelagic

The plankton: a new understanding

The phytoplankton

The zooplankton

The nekton

Living in the epipelagic

Staying afloat

Predators and their prey

Epipelagic food webs

Trophic levels and energy flow

The microbial loop

Patterns of production

The El Niño-southern Oscillation

THE OCEAN DEPTHS

The twilight world

The animals of the mesopelagic

Adaptations of midwater animals

The world of perpetual darkness

The lack of food

Sex in the deep sea

Living under pressure

The deep-ocean floor

Feeding in the deep-sea benthos

The nature of life in the deep-sea benthos

Microbes in the deep sea

Hot springs, cold seeps, and dead bodies

RESOURCES FROM THE SEA

The living resources of the sea

Food from the sea

Marine life as items of commerce and recreation

Non-living resources from the sea floor

Oil and gas

Ocean mining

Non-living resources from seawater

Fresh water

Minerals

Energy

THE OCEANS AND HUMAN AFFAIRS

Oceans as barriers and avenues

Oceans and cultures

Oceans and recreation

Prospects for the future

OUR CHANGING PLANET

Rolling the dice: climate change

Ocean acidification
 Overwhelming the Nitrogen cycle
 The No-zone
 Stripping the Sea bare
 Disappearing habitats
 So what do we do?

GENERAL INSTRUCTIONAL OBJECTIVE

Students will acquire basic knowledge about population dynamics and the major subdivisions of the marine environment, with a special emphasis on the eastern Mediterranean region.

SPECIFIC LEARNING OUTCOMES

At the end of this course, students will be able to:

	Learning outcome	LO	Means of attainment	Means of assessment
1	Demonstrate knowledge concerning the basic principles of ecology applied to the marine world	14	T,P,D	WE,D
2	Describe and diagram the major subdivisions of the marine environment.	2,5,6	T,A,P,D	WE,P,D
3	Demonstrate an understanding of how physical factors affect intertidal and soft-bottom intertidal communities.	2,5,6	T,A,P,D	WE,P,D
4	Compare and contrast between the major types of estuaries, their physical characteristics.	2,5,6	T,A,P,D	WE,P,D
5	Describe the most important types of estuarine organisms and their adaptations to changes in salinity and oxygen conditions.	2,5,6	T,A,P,D	WE,P,D
6	Demonstrate an understanding of the most important physical characteristics influencing subtidal communities.	5,6	T,A,P,D	WE,P,D
7	Describe the most important types of organisms found in unvegetated and hard-bottom subtidal communities.	5,6	T,A,P,D	WE,P,D
8	Explain the most important aspects of reef-building corals.	5,6	T,A,P,D	WE,P,D
9	Explain the most important physical factors influencing the development, growth, and geographical distribution of coral reefs.	5,6	T,A,P,D	WE,P,D
10	Compare and contrast between the three major types of coral reefs and their communities.	5,6	T,A,P,D	WE,P,D
11	Describe the most important groups of organisms that comprise the phytoplankton and zooplankton.	5	A,P,D	WE,P,D
12	Demonstrate an understanding of the most	5,6	T,A,P,D	WE,P,D

	important characteristics of epipelagic organisms.			
13	Demonstrate an understanding of the most important physical characteristics influencing communities of the ocean depths.	2,6	A,P,D	WE,P,D
14	Compare and contrast between the most important types of animals found in and below the mesopelagic, on the deep-ocean floor and in deep-sea hydrothermal vents and their adaptations.	5,14	T,A,P,D	WE,P,D
16	List some of the major fish food species and non-living resources of the sea.	1	T,A,P,D	WE,P,D
	Demonstrate an understanding of the managing of resources.			
	Demonstrate an understanding of the influence of oceans on culture through history.			
	Understand and use of proper vocabulary			

T= textbook/A=additional readings/P=PPT presentation/D=class discussion/L=lab session/F=field session/
WE=written exam/LE=lab exam/LR=lab report

Journal Paper Presentation:

Readings of current original research papers in the field of marine ecology will supplement the lecture material. Each student will be assigned a research paper and give a 10-12 minutes presentation with an additional 3-5 minutes for questions to the class at the end of that lecture day. The presentation should address the goals of the research, the methods employed to carry out those goals, what was learned from the study, what conclusions were supported by the data, what the limitations were, if any, and how might the study be improved or expanded. Oral presentations should be in PowerPoint format. Only one presentation will be given at the end of any lecture.

GRADING

Midterm Exam = 100 points

Final Exam = 100 points

Journal paper presentation = 40 points

Attendance and participation = 10 points

Total = 250 points

IMPORTANT

Attendance is mandatory. You must have an approved university excuse for missing an exam otherwise you will be assigned a score of zero. Make-up exams are oral and will cover all the required chapters. Cheating will not be tolerated and will be dealt with severely. We all realize that grades are very important in a highly competitive pre-med environment, but please do not risk your grade, reputation, and career by falling prey to this temptation.

No cell phones and no programmable calculators are allowed in examination rooms.