Course title: Marine Biology & Ecology
Course code: (GI) ECOL 2001 MEME
Programs offering course: Yucatan Open Campus Block
Open Campus Track: STEM and Society
Language of instruction: English
U.S. semester credits: 3.00
Contact hours: 45.00
Term: Spring Block III 2021

Course Description

Life on Earth began in the ocean 3.9 billion years ago. It is still by far the largest coherent ecosystem, and life conditions are different compared to living in air on land. Light only penetrates a few hundred meters down, below is total darkness. This course will provide knowledge about the physical and chemical properties of seawater, and how it affects life. Students will study and compare the dynamics of the major habitats, such as deep sea, open waters, coastal regions, estuaries, coral reefs, and polar regions. The course will present the dominating organisms in each compartment and contrast the flows of energy, carbon and nutrients. The course will also study the hydrodynamics of oceans, a key factor in understanding weather and climate changes. Students will be shown different marine sampling and measuring techniques, and visit research facilities.

Learning Objectives

By completing this course, students will:

- Understand the origin, biological history, and hydrography of the oceans.
- Compare the various habitats that are present in oceans and how they differ.
- Critically evaluate the essential characteristics of the pelagic zone.
- Recognize food webs, nutrient cycles, and feeding mechanisms.
- Understand the biology of selected groups of marine invertebrates and vertebrates.
- Assess the complexity and fragility of the oceans; analyze the impact of human behavior on environmental systems.

Course Prerequisites

Students should have completed one semester in biology and one semester in chemistry.

Methods of Instruction

The teaching will consist of introductory lectures using PowerPoint and short films. The students write a paper on individually selected topics, finalized by an individual presentation. The instructor will frequently ask questions during the lectures, and the students are expected to engage in discussions about what they are learning as well as their ongoing projects. Guest speakers will share expert knowledge in the form of presentations of various subjects within marine biology. Occasionally there will be allocated time to work on the individual assignments.

Assessment and Final Grade

1. Critical Reflections 25%
2. Individual Project Paper 25%
3. Marine Organism Report 15%
4. Presentation 20%
5. Participation 20%
TOTAL 105%

Course Requirements

Critical Reflections
At the end of weeks 2, 4, and 6 the students will be given three essential questions on topics covered in class that week to be completed at home in a time limited assessment through Canvas. Questions are short-essay type, and students will be expected to demonstrate comprehensive knowledge of the mandatory readings in their responses. Each critical reflection will be 650 words exactly.

**Individual Project Paper**

At the start of Week 2 the students will select a topic for a 2000-word research report. The report will consist of an introduction, discussion, conclusion, literature list and an abstract. Students will meet weekly in small groups during class time and present project developments to fellow group members. The paper will be graded by: how thoroughly the subject is reviewed and discussed, and how appropriate the literature selection is. Students will receive their grade after they have made their presentation of the paper, which should be no longer than 10 minutes in length. The final grade for this assessment will consist of 80% based on the written content of the paper, and 20% on the presentation. The project paper requires students to: select an aquatic ecosystem; detail five organisms that live within this ecosystem; discuss the nature and management of environmental threats to this ecosystem, and; support their findings with five academic references.

**Marine Organism Report**

Through the accumulation of knowledge throughout the course and additional research undertaken, students will write a 1500-word report on an individually selected organism.

The report is to include; information regarding the classification of the organism; biological features of the organism; features of the organism as a response to environment (long-term adaptations); mechanisms utilized by the organism to cope with acute environmental stress (short-term adaptations); a detailed diagram of organism with annotated notes, and use five academic references to support findings. The report will be graded based on a student’s ability to present factual information clearly, include a detailed annotated diagram and evidence a level of understanding in regards to the relationship between the ecosystem(s) and the organism with a depth of knowledge depicted regarding organism adaptation to long term and acute environmental stress.

**Presentation**

Each student will deliver a 10-minute presentation on their Individual Project Paper topic. Students are to present information in audio-visual format such as PowerPoint, Google slides, Canva or Prezi. They are to include a maximum of FIVE slides. Student’s work will be graded on the detail and familiarity of content with support from academic research selection. The presenter will also be graded on their ability to engage with the audience and answer questions about their paper, in a question and answer style forum following their presentation.

**Participation**

Participation is valued as meaningful contribution in the digital and tangible classroom, utilizing the resources and materials presented to students as part of the course. Meaningful contribution requires students to be prepared in advance of each class session and to have regular attendance. Students must clearly demonstrate they have engaged with the materials as directed, for example, through classroom discussions, online discussion boards, peer-to-peer feedback (after presentations), interaction with guest speakers, and attentiveness on co-curricular and outside-of-classroom activities.

**Attendance**

Regular class attendance is required throughout the program, and all absences will result in a lower participation grade for any affected CIEE course. Due to the intensive schedules for Open Campus and Short Term programs, absences that constitute more than 10% of the total course will result in a written warning.

Students who transfer from one CIEE class to another during the add/drop period will not be considered absent from the first session(s) of their new class, provided they were marked present for the first session(s) of their original class. Otherwise, the absence(s) from the original class carry over to the new class and count against the grade in that class.

For CIEE classes, excessively tardy (over 15 minutes late) students must be marked absent.

Attendance policies also apply to any required co-curricular class excursion or event, as well as to any required field placement. Students may not miss placement/work hours at an internship or service learning site unless approved in advance by the Academic Director and placement supervisor. All students must complete all of the requisite 100 minimum work hours on site at the internship or service learning placement to be eligible for
Students who miss class for personal travel, including unforeseen delays that arise as a result of personal travel, will be marked as absent. No make-up or re-sit opportunity will be provided.

Attendance policies also apply to any required class excursion, with the exception that some class excursions cannot accommodate any tardiness, and students risk being marked as absent if they fail to be present at the appointed time.

Absences for classes will lead to the following penalties:

<table>
<thead>
<tr>
<th>Percentage of Total Course Hours Missed</th>
<th>Minimum Penalty</th>
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</thead>
<tbody>
<tr>
<td>Up to 10%</td>
<td>Participation graded as per class requirements</td>
</tr>
<tr>
<td>10 – 20%</td>
<td>Participation graded as per class requirements; grade penalty &amp; written warning</td>
</tr>
<tr>
<td>More than 20%</td>
<td>Automatic course failure, and possible expulsion</td>
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</tbody>
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N.B. Course schedule is subject to change due to study tours, excursions, or local holidays. Final schedules will be included in the final syllabus provided to students on site.

**Weekly Schedule**

**Week 1**

**Class: 1.0  Introduction and Origin of the Ocean**

In this initial lecture, an introduction to the origin of the ocean, as well an overview of its chemical and biological history is overviewed. A short introductory video developed by National Geographic will be viewed and discussed.

Reading:


Resource Link:


**Week 2**

**Class: 2.0  Hydrography**

Building on the content of the previous lecture, students will explore key features of the hydrography of the ocean: salinity, temperature, depth, currents, tides, stratification, hydrological cycle and surface/air interactions. Time will be allocated for the process of individual Project Paper topic selection within this session.

Reading:


Resource Link:

Due Date for the Submission of Individual Project Paper Topic Selection

Class: 3.0 Habits

Students will be presented information about the typical habitats present in the oceans: coastal waters, estuaries, hard bottom, soft bottom, pelagic life and benthos. They will attend a site visit to further discuss the habitats.

Students will undertake a co-curricular activity to a local aquarium.

Reading:

Resource Link: http://sims.org.au

Due Date for Submission of the First Critical Reflection Assessment

Week 3
Class: 4.0 Life in the Pelagic

In this session, students will receive insights into the pelagic zone (open ocean zone) and will focus on aspects such as: phytoplankton, species, seasonal cycles, primary production and zooplankton. Knowledge will be reinforced through the exploration of a case study featuring the infamous, and arguably, misrepresented great white shark (Carcharodon carcharias).

Reading:

Resource Link: National Geographic https://www.nationalgeographic.com/animals/fish/g/great-white-shark/

Class: 5.0 Feeding Methods

Students will receive an introduction to the various feeding methods of marine organisms: filter feeding, detritivores, carnivores and secondary production. To complement this theory, a guest scientist from the local marine science institute will present an interactive session including living organisms, and will discuss the effects of marine pollution on the health of filter feeders such as oysters.

Reading:


Class: 6.0 Shared Knowledge

Students will conduct their individual presentations.

Due Date for Submission of the Presentation Assessment

Week 4
Class: 7.0 Food Webs
In this lecture students will learn about different food webs in marine ecosystems: microbial food webs, nutrient recycling, and energy transfer in coastal waters and the deep sea.

Reading:

**Due Date for Submission of the Individual Project Paper Assessment**

Class: 8.0 Invertebrates

In this lecture an introduction to the biology of some of the most common invertebrates in the ocean: cnidarians, Polychaeta, crustaceans and echinoderms will be offered. In addition to this, students will form small groups of three to four, and utilize the online database of the Smithsonian Institute’s Ocean Life branch to gather additional information about invertebrates of interest. Students will investigate specific marine animals of the host country.

Reading:

Resource Link:

Class: 9.0 Marine Environments

Students will undertake a co-curricular activity to a significant rock platform at a nearby coastal stretch or national park.

**Due Date for Submission of the Second Critical Reflection**

**Week 5**

Class: 10.0 Vertebrates

The lecture this week will offer an introduction to the biology of fish, sea birds and mammals.

Reading:


Resource Links:

Class: 11.0 Marine Sampling and Measuring

Students will receive an introduction to the monitoring and measuring methods used in the oceans and harbors in this lecture. Students will cooperatively explore real-time reports for beach and harbor health, through the New South Wales government Office of Environment & Heritage’s web page.

**Due Date for the Submission of the Third Critical Reflection**

**Week 6**

Class: 12.0 Conservation
From this interactive lecture, students will receive insight into speciation, invasion, extinction and how to conserve marine biodiversity. A local case study on the threats to biodiversity and the measures taken to reduce or eliminate them will be examined. Following this analysis, a guest speaker from a local organization will present information regarding the work being undertaken.

Reading:


Class: 13.0 Human Impact on the Environment

In this lecture, students will receive an overview of some of the impacts we have on the ocean: pollution, fisheries, runoff, human activities at sea, and climate change. Through the analysis of a case study featuring Australia’s Great Barrier Reef, students will consolidate their theoretical knowledge. This lecture will feature a video conferencing opportunity, wherein students will virtually explore the Great Barrier Reef. Future information will be gathered in small groups by investigating tours of the Great Barrier Reef offered through Google Earth.

Reading:


Resource Links:

Video conference:


Due Date for the Submission of the Marine Organism Report

Course Materials

Readings


Online Resources

dartconnections.org.au/providers/great-barrier-reef


https://ocean.si.edu/ocean-life/invertebrates

https://video.nationalgeographic.com/video/oceans-overview


https://www.marineconservation.org.au

https://www.nationalgeographic.com/animals/fish/g/great-white-shark/

https://www.youtube.com/watch?time_continue=35&v=MGGEY4_8tLQ