

**Coral Reef Ecology, Health, and Conservation
Lab/Field Experience
Spring 2022**

EVPP 466-201 (CRN 22592)/BIOL 440-201 (CRN 22620)

Exploratory Hall, Room 2602

Thursdays, 1:30-4:10 p.m. (class starts at 2:00 p.m. to allow for lunch break)

Instructors: Dr. Esther Peters, Dr. Thomas Wood
Backup Instructor: Dr. Jennifer Salerno
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Office Locations 3050 David King Hall, 434 Enterprise Hall, Fairfax Campus
Office Hours: Dr. Peters: Thursdays (4:30–5:30 p.m.) or BY APPOINTMENT*
Dr. Wood: BY APPOINTMENT*

*Please send an e-mail request for an appointment to either Dr. Peters or Dr. Wood. Preferably confirm by e-mail if you will meet either in person or in Zoom at least 24 hours in advance.

Sign up for Mason Alert (e.g., weather closings, emergencies) at <https://alert.gmu.edu>

See Emergency Preparedness Guides at (http://ehs.gmu.edu/guides_EP.html)

COVID-19 news: <https://www2.gmu.edu/news/2021-01/safe-return-mason-starts-you>

Prerequisites

Permission of the instructor (contact Dr. Peters)

Additional Requirements

A previous course in coral reef ecology or registration in the concurrently offered 3-credit lecture course for Coral Reef Ecology, Health, and Conservation.

Course Description/Overview

Students will learn about current coral reef ecology and conservation knowledge and efforts, as well as the environmental and anthropogenic stressors threatening coral reefs and the

organisms that inhabit them. During on-campus sessions students will learn about reef species identifications, underwater research methods, and journal writing. This will prepare students for the 0 or 1-credit travel-abroad course (GEOC 202, Summer 1) to experience the beauty, biodiversity, productivity, and demise of coral reefs by participating in a 7-day trip to the Caribbean island of Roatán in May, immediately following graduation. There, students will study the natural and societal aspects of coral reefs, reef evolution, research being conducted on Caribbean reefs, and the diversity of approaches to conserve reef resources. They will stay at Anthony's Key Resort and participate in the educational program at the Roatán Institute for Marine Sciences (RIMS), be introduced to the reef biota and apply reef organism identification skills as they practice collecting reef condition data through SCUBA diving or snorkeling on nearby reefs, learn about marine mammals and interact with the Atlantic bottlenose dolphins in the dolphin Encounter program, and visit the RIMS coral nursery to learn about coral husbandry and reef rehabilitation programs. In addition, advanced SCUBA divers will learn skills to complete training as scientific divers under George Mason University's American Academy of Underwater Sciences (AAUS) program. This international field component will deliver real-world experience during a semester-long course that provides the intellectual basis for understanding this unique ecosystem.

Learning Objectives

On completion, students will be able to:

1. Understand the complexity of coral reefs and their conservation through witnessing the current condition of the reefs in Roatán.
2. Describe the geology of these ecosystems and their relationship to other ecosystems such as mangroves and sea grass beds.
3. Identify different types of corals, as well as families of fishes and other reef creatures and discuss the symbiotic and ecological relationships they have with one another.
4. Apply scientific reasoning to conservation issues and collect, record, and process information associated with their observations.
5. Discuss global and local threats affecting Roatan's reef organisms and how they impact the ecosystem and are linked to human health (as related to the 'One Health' concept)

Instructor Expectations

Class participation will be required of each student, according to the course schedule below. Students are expected to read books and journal articles, study supporting materials, and prepare assignments outside of class. Students are required to organize material logically and communicate effectively orally and in writing. Students will be expected to participate in all activities, behave properly, and must adhere to all policies and rules during the Roatán

field experience, which will also involve more strenuous physical activities of SCUBA diving or snorkeling.

Attendance in classroom sessions is required. Tardiness and absenteeism should be limited to illness or emergencies. Dr. Peters should be notified PRIOR to the start of class if a student will not be in attendance. Students should come to class ready to participate in all activities with assignments and readings completed prior to class, behave in a mature and professional manner, and abide by the GMU honor code.

All students taking courses with a face-to-face component must follow the university's public health and safety precautions and procedures (<https://www.gmu.edu/safe-return-campus>) and complete the Mason COVID Health Check daily, seven days a week.

The COVID Health Check system uses a color code system and students will receive either a **Green**, **Yellow**, or **Red** email response. Only students who receive a “green” notification are permitted to attend courses with a face-to-face component. If you suspect that you are sick or have been directed to self-isolate, please quarantine or get testing. Faculty are allowed to ask you to show them that you have received a Green email and are thereby permitted to be in class. Please be sure you wear your mask during our sessions. Use the hand sanitizer from the dispenser on entering the room (and as you need it!).

More students are juggling work, research, internships, shadowing, and families, as well as COVID-19 issues. Please note “employment must not take priority over academic responsibilities. Students employed more than 20 hours a week are strongly urged not to attempt a full-time academic load. Students employed more than 40 hours a week should attempt no more than 6 credits per semester. Students who fail to observe these guidelines may expect no special consideration for academic problems arising from the pressures of employment.” (University catalog, section AP.1.2. Academic Load, see: <http://catalog.gmu.edu/content.php?catoid=27&navoid=5365#attendance>). Please consider your responsibilities and interests and plan accordingly to protect your health and GPA! Please contact Dr. Peters if you have any concerns during the semester!

E-mail Communications

The instructors will send e-mail messages only to your GMU e-mail account, usually through Blackboard. Students must use their Mason email accounts to receive important University information, including messages related to this class. **Please be sure you check it often and respond to queries from any of the instructors!** If you are not getting messages, please send Dr. Peters an alternate e-mail address.

Lab/Field Experience Assignments

Students will gain skills pertinent to working in environmental science, biology, and conservation, including:

(1) Reef Study Methods

To understand different reef habitats and detect changes in the species present and their health, scientists measure numerous environmental parameters and collect samples of organisms for further chemical, geological, physical, and biological laboratory analyses. Students will examine recent peer-reviewed literature on coral reef monitoring methods and prepare tools to use in collecting data for one protocol, the Atlantic and Gulf Rapid Reef Assessment (AGRRA), while in Roatán. Undergraduates will learn how to apply AGRRA methods.

(2) Reef Organism Identification

Students will review text and online taxonomic keys and images to learn how to identify corals, fishes, and other organisms with the instructors. They will be exposed to many of these species on the trip to Roatán. A species' identification quiz will be given prior to the trip. Undergraduates will learn how to correctly identify at least 40 species of fishes and 10 species of corals.

(3) Journaling

Documenting what is happening in the environment and thinking critically about your observations is an important skill to be applied when keeping laboratory notebooks or field logs. During the field trip to Roatán, students will be immersed in the environment and making observations on the habitats and organisms present on this Caribbean island. They will perform coral reef survey techniques by snorkeling or SCUBA diving and compare the condition of different reef sites based on fish, coral, and benthic organism (plant and animal) populations. They will also make observations on societal, economic, political, and other factors related to coral reef conservation. To assist in developing your skills and learning through these observations, whether you participate in the field trip or not, students will learn about Front Line journaling and Reflective journaling. More information, rubrics, and practice assignments will be provided during this course.

Readings

(1) Required (Selected chapters will be assigned, links posted in Blackboard):

1. *Caribbean Reef Life: A Field Guide for Divers*, 3rd edition. Mickey Charteris, 2017. Mill City Press, **purchase online**

2. *Healthy Reefs for Healthy People*, www.healthyreefs.org/cms/publications. The Healthy Reefs for Healthy People Initiative (HRI), *A Guide to Indicators of Reef Health and Social Well Being in the Mesoamerican Reef Region* (2007) and *Quick Reference Guide* (2008)
3. Atlantic and Gulf Rapid Reef Assessment, www.agrra.org
4. *Roatan Institute for Marine Sciences' Instructors Manual: Planning a Field Course*, will be provided in Blackboard.

(2) Other recommendations, if interested:

1. *Towards Reef Resilience and Sustainable Livelihoods: A Handbook for Caribbean Coral Reef Managers* (Download at <http://www.researchstationcarmabi.org/>).
2. *Coral Reefs in the Anthropocene*, ed. Charles Birkeland, Springer, 2015. Available online from the GMU library.
3. *The Coral Reef Era: From Discovery to Decline, A History of Scientific Investigation from 1600 to the Anthropocene Epoch*. James Bowen, Springer, 2015. Available online from the GMU library.
4. *A Guide to the Coral Reefs of the Caribbean*. Mark Spalding, 2004, University of California Press, Berkeley, CA. (Amazon, \$14.95)

(3) Assigned Readings (ALL STUDENTS):

- All assigned readings are listed in the course schedule, posted on Blackboard, and should be completed PRIOR to class.

Additional Resources:

Study guides and resources for helping with identification are provided on Blackboard and will be presented in class. These focus on coral, fish, and invertebrate identifications.

Grading

Class Participation	25%
Organism ID Quiz	25%
<u>Journaling Assignments</u>	<u>50%</u>
Total	100%

For undergraduates, the final grade will be based on this scale: A+ = 100–98%, A = 97–93%, A- = 92–90%, B+ = 89–86%, B=85–83%, B- = 82–80%, C = 79–70%, D = 69–60%, F < 59%. A CURVE WILL NOT BE APPLIED.

Course Materials

See required textbooks under Readings, above. Students will need SCUBA or snorkeling equipment for the field study, which may be rented from George Mason SCUBA LLC or at Anthony's Key Resort (mask, snorkel, fins of their own are recommended; Dr. Wood will discuss options), and should provide their own sun protection (e.g., lycra diveskin or 3-mm wetsuit, or yoga pants and rash guard, booties, hat or hood), and sturdy closed-toe walking shoes (in addition to waterproof sandals, flipflops are not recommended).

Honor Code

The GMU code of honor states that cheating and attempted cheating, plagiarism, lying, and stealing will not be tolerated. Honor code violations discovered by either students, staff, or faculty will be referred to the Honor Committee. Unless otherwise noted by the instructor, quizzes will be taken without the use of study aids, memoranda, textbooks, other books, data, or other information available. The purpose of these assessments is to evaluate the student's progress in understanding the material.

It is important to note that materials produced for this course require creativity in organization and presentation, but that the information presented within the paper or other product must be properly acknowledged as to its source. Statements of a general nature or that synthesize information from several sources need not be attributed to a specific source; however, statements of specific details or direct quotations ("between quotation marks") from books, journals, newspaper or other media articles, Internet web pages, or other authorities must be identified with the name of the author and year in the text and the full citation provided at the end of the paper or other product

Additional Areas of Mention (University Policies, Resources, etc.)

NAME AND PRONOUN USE: If you wish, please share your name and pronouns with me and how best to address you in class and via email. I use "she/her/hers" for myself and you may address me as "Dr. Peters" in email and verbally.

WRITING CENTER: <https://writingcenter.gmu.edu>

UNIVERSITY LIBRARIES: "Ask a Librarian" <https://library.gmu.edu/tutorials/librarians-help>

COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS): <https://caps.gmu.edu>

DISABILITY SERVICES: <https://ds.gmu.edu>

LEARNING SERVICES: 703-993-2999; <http://caps.gmu.edu/learningservices/>; offers many good study skills workshops!

The University Catalog, <http://catalog.gmu.edu>, is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at <http://universitypolicy.gmu.edu/>. All members of the university community are responsible for knowing and following established policies.

Student communication of e-mail information (Opt-in Form):

<https://provapps.gmu.edu/hb1app/>.

COURSE SCHEDULE* AND ASSIGNMENTS (complete PRIOR to class):

***Schedule is subject to change based on weather conditions or other events.**

Note that class will not meet every week, although you will be expected to be studying on your own to prepare for the next class. Please let Dr. Peters know if you have any questions or concerns about this schedule!

Week	Date	Topics	Readings for Next Class
1	January 27 <i>January 31 Last Day to Add</i> February 7 <i>Last Day to Drop</i>	Introductions, explain preparation and plans for field trip, assigned readings and learning objectives, course focus, journaling and participation, snorkeling and dive training overview Introduction to field research, coral reef organism identifications: What do we need to know about coral reefs, why, and how? Structure vs. function, diseases of reef organisms.	Caribbean Reef Life, identifying reef organisms Journal article(s) on reef monitoring (individual or by groups) to report on next session Atlantic and Gulf Rapid Reef Assessment protocols (http://www.agrra.org), indicators and training tools
3	February 10 <i>Unrestricted Withdrawal Period February 15– March 1</i>	Continue lecture and discussion on field research: Monitoring protocols for coral reefs, journal articles reviewed AGRRR Protocols Journaling instruction	Study fish, coral, and other species identifications, applications in monitoring coral reef condition Journaling practice assignment

5	February 24	<p>Design AGRRA reef monitoring tools and practice species identifications</p> <p>Discuss journaling practice assignment</p> <p>BE SURE TO SUBMIT GEO APPLICATION FOR THE ROATÁN TRIP BY MARCH 10!</p>	<p>Study fish, coral, and other species identifications, applications in monitoring coral reef condition</p> <p>Journaling practice assignment</p>
7	<p>March 10</p> <p><i>Selective Withdrawal Period March 2–April 11</i></p>	<p>Discuss journaling practice assignment</p> <p>Review of coral and fish species identifications with Dr. Peters and Dr. Wood</p> <p>Build AGRRA tools and copy data sheets</p>	<p>Study fish, coral, and other species identifications</p> <p>Journaling practice assignment</p>
8	March 14–20	Spring Break	
9	March 24	<p>Discuss journaling practice assignment</p> <p>Practice using AGRRA tools and data sheets</p> <p>TBA: GEO Breakout Session for Roatán: Review travel information, room assignments, safety procedures, etc.</p>	<p>Obtain snorkeling or SCUBA gear (consult with Dr. Peters and Dr. Wood)</p> <p>Study fish, coral, and other species identifications</p>
10	March 31	<p>WATER TIME – Swim evaluations and snorkeling training at the GMU Aquatic and Fitness Center</p>	<p>Study fish, coral, and other species identifications</p>
11	April 7	<p>WATER TIME – SCUBA diving refresher at the GMU Aquatic and Fitness Center</p>	<p>Study fish, coral, and other species identifications</p> <p>Schedule fish and coral quizzes with Dr. Peters and Dr. Wood</p>

13	April 21	<p>Take fish and coral quizzes</p> <p>Distribute AGRRA tools and data sheets to students to pack</p>	<p>Prepare checklist for packing for Roatan, be sure you have all medications, masks, safety aids, snorkeling or diving gear and the AGRRA equipment you will take to Roatán, minimize clothing (this is a dive resort, not a fancy luxury resort), maximize foot protection</p>
15	May 5	NO FINAL EXAM!	PACK FOR ROATÁN TRIP!
GEOC 202 Field Trip to Roatán	May 21–28 (DRAFT)		
	Saturday	Fly to Roatán, unpack, welcome dinner, journaling	
	Sunday	RIMS orientation, dive/snorkel checkout and reef trip, RIMS lectures, reef trip to practice species identifications, journaling	
	Monday	Dive/snorkel reef trip on way to Maya Key for picnic and tour of Animal Sanctuary and Rescue Center, dive/snorkel reef trip on return, journaling	
	Tuesday	RIMS mangrove lecture and snorkeling trip to see mangroves, beach snorkel/dive to conduct reef survey, RIMS Dolphin Lecture I, journaling	
	Wednesday	RIMS lecture on reef threats, beach snorkel/dive to conduct survey, boat trip to snorkel/dive at RIMS Coral Restoration Nursery, Dolphin Lecture II, BBQ	
	Thursday	Fiesta, journaling	
	Friday	Beach snorkel/dive to conduct reef survey, Dolphin Swim, RIMS Night Dive Lecture, night dive, journaling	
Saturday	Trip to Blue Harbor Arboretum & Hydroponic Garden, RELAX, PACK		
		Fly home	

Notes: