

## Coral Reef Ecology - Belize

### COURSE INFORMATION & SYLLABUS

June 24 – August 2, 2024

*[please read this syllabus carefully, and refer to it throughout the course]*

#### 2024 Program Dates:

- **June 24 - July 14, 2024:** ONLINE course materials in coral reef ecology
- **July 15 – 18:** Content wrap-up; prepare for departure!
- **July 19 – August 2:** FIELD expedition to Belize!

See detailed schedule attached for course content each week

#### Program Overview:

Coral Reef Ecology blends adventure and education in the study of the most diverse marine ecosystems on Earth. Coral reefs are our focus, but no study of corals would be complete without investigating their crucial partnerships with mangroves, seagrasses, and the open ocean environment. **There are two tracks for this course**, depending on whether you have taken the Botany 265: Rainforests and Coral Reefs FIG at UW-Madison the previous fall semester.

- **TRACK 1: 3-week Online Course + 2-week Field Expedition in Belize (5 weeks, 4 credits)**  
*Students on Track 1 receive three weeks of intensive online learning to gain a solid background in principles of oceanography, coral reef ecology, and marine conservation prior to the expedition to Belize. You will collaborate with your peers before you travel and develop a research proposal for a scientific study that you'll carry out once at the Glover's Reef marine research station.*
- **TRACK 2: 2-week Field Expedition in Belize + 3 Online Preparatory Meetings (2 credits)**  
**Open only to students enrolled in Botany 265 during the prior semester.**

Online content will be delivered on Canvas and via Zoom.

Zoom link (recurring): Meeting ID: **851 1405 8308** Passcode: **CoralReefs** ([zoom link](#))  
Canvas course page: <https://canvas.instructure.com/courses/2704348>

**All students (Tracks 1 and 2) are required to participate in  
all three synchronous meetings**

Meeting attendance is required, so please clear your schedule ahead of time. Inform your instructor of any conflicts immediately. Scheduled synchronous meetings:

**Zoom Meeting 1: 6/24 @ noon – 1:30 pm CST – Introduction & Orientation to Belize**

**Zoom Meeting 2: 7/3 @ noon – 1:30 pm – Project Ideas Discussion**

**Zoom Meeting 3: 7/12 @ 3:00-4:30 pm – Project Proposal Presentations**

## Field Expedition to Belize:

The **14-day field expedition** will take place on the Mesoamerican Barrier Reef, a UNESCO World Heritage Site in the charming Caribbean nation of Belize. We'll be housed for most of the time at the Glover's Reef Research Station, on a small island owned by the Wildlife Conservation Society in Glover's Reef Marine Reserve and atoll. The expedition, led by experts in tropical marine ecology, will include field instruction, shore hikes, daily snorkeling, and small group research projects.

## Meet Your Instructors!



### **Catherine Woodward, PhD**

#### **Professor**

[cwoodward@ceiba.org](mailto:cwoodward@ceiba.org)

Catherine is teaching faculty at the University of Wisconsin-Madison, and professor for the Rainforests and Coral Reefs FIG. She is a tropical ecologist with over 10 years experience teaching field courses in marine biology and tropical ecology, and currently serves as the President of the Ceiba Foundation, where she coordinates conservation projects in terrestrial and marine ecosystems in Ecuador.



### **Teal Guetschow, PhD candidate**

#### **Instructor**

[trguetschow@gmail.com](mailto:trguetschow@gmail.com)

Teal is a FIG alum (2014) and graduated from UW's Environmental Conservation Professional Masters program in 2017. She interned in marine conservation with the Wildlife Conservation Society in Belize, working on fish stock assessment within the Glover's reef marine reserve, and is currently working towards a PhD in marine science at Arizona State University.



### **Joe Meisel, PhD**

#### **Professor**

[jmeisel@ceiba.org](mailto:jmeisel@ceiba.org)

Joe is a tropical ecologist, author, and scuba diver who has been leading field courses since 1999. He received his PhD in Zoology from the University of Wisconsin-Madison in 2005. His current research includes the identification of priority areas for conservation using GIS. He is the author of *Introduction to the Orchids of Tropical America*, and soon will publish a book on marine fishes.

## Two-credit vs. Four-credit Tracks:

Coral Reef Ecology offers a 2- or 4-credit track, depending on prior participation in Dr. Woodward's Botany 265 Rainforests and Coral Reefs FIG at the University of Wisconsin (UW). UW adopts the Carnegie standard of 45 hours of learning activities per credit. You can expect to spend 30-35 hours during the online portion, and the remainder (and then some!) in Belize.

### I. Online Portion (Track 1 students only, 4-credits):

Content will be accessed through the Canvas platform. Expect a fast-paced immersion in coral reef ecology, committing 10-12 hours per week on the online content, plus collaboration with your peers to develop a research proposal. The online content will include one weekly synchronous session

involving students enrolled in both tracks, but otherwise will be asynchronous, and include video lectures, discussion forums, and online collaboration tools focused on the fundamentals of oceanography and the ecology of mangrove, coral reef, and seagrass ecosystems. Students in Track 1 will also design their research projects during this time period.

**Synchronous Meetings:** All students are expected to participate in three synchronous meetings (all accessed by the Zoom links on page 1). The first is an orientation to the course, the second is to discuss marine science research projects, and the last is for you to present your research proposals. The schedule for the synchronous meetings is shown above.

**Asynchronous Lectures:** Content each week will feature several online learning modules on coral reef biology. They can be viewed on a laptop or tablet, though viewing on your phone is not recommended. You are expected to view the lectures for each week in sequence, and in time to take the summative online quiz, available over the last three days of each week.

**Discussions and Assignments:** During the online portion of the course we will have 2-4 asynchronous online discussion forums. Most of these are geared to helping you develop your research question. You will be prompted with questions and asked to respond with your opinions and insights. The course instructors will serve as moderators and facilitators of online discussions. There also will be a couple of short in-class assignments, as well as field activities conducted during the field portion of the course. These activities will be completed individually or in small groups.

**Group Research Projects:** Everyone will carry out a research project in a small group (2-4 students per group). The purpose of this project is to provide you the opportunity to gain experience in developing and conducting a marine research study and to develop skills using the scientific method.

During the online portion of the course you will develop ideas and formulate a central question (along with several backup options) and a hypothesis for each that you would test during our time in Belize. Once in Belize, you will practice and refine proposed data collection methods, collect data in the field, analyze the data, and write up your findings in a scientific paper format as well as in an oral presentation (in scientific conference presentation format). Everyone is expected to contribute *equally* to each component of the research project to the best of their ability. Detailed instructions and a rubric will be provided to guide group research projects.

**Quizzes:** There will be three online quizzes, available for the last three days of each week. The quizzes are designed to ensure you have learned the basic concepts from the lectures and readings, which will be built upon during the field portion of the course. The third quiz is cumulative. You will have two attempts to take each quiz, however your final grade is the average of your two attempts, so it is in your best interest to do as well as you can on the first attempt ... study for it! There are also ungraded self-tests distributed throughout so you can assess your progress on the learning objectives. Note, there will be a field quiz near the end of the first week of the field expedition to assess your ability to identify common organisms in the marine environment. For more details on how you'll be assessed in this course, see the sections on Participation and Grading below.

## **II. Field Expedition (Track 1 & 2 students):**

The field component will take place at the Glover's Reef Research Station in the Glover's Reef Marine Reserve and mainland sites. Here, we will enjoy full days in the field to reinforce what was

learned during the online course (or in Botany 265 for Track 2 students), in a hands-on environment. Upon arrival, we will orient ourselves to Belize with a visit to rainforest and mangrove ecosystems. We will then travel offshore to Glover's Reef Atoll and gain experience in marine field research through structured field activities to practice and refine proposed research methods. Over the next week, you will refine and carry out your proposed group research project, obtaining guidance and feedback from course instructors and participating in nightly group reflections. During the final few days, you will analyze the data, write up your findings, and prepare an oral presentation to present to the class. Daily fieldwork will be complemented by group discussions and presentations on marine conservation.

### **III: Online Preparation for Track 2 Students (FIG only):**

Track 2 provides FIG students the opportunity to carry out their research project in Belize alongside students in Track 1 who will have just completed the online course.

Students in Track 2, however, are required to participate in the three synchronous online meetings via Zoom (see page 1). These meetings are important for the preparation of all students to travel to Belize. The first meeting is a pre-departure orientation and provides the opportunity for students in Tracks 1 and 2 to get to know one another. The second and third meetings are focused on helping students prepare for their research project in Belize, including FIG students who will revisit and refine the research proposals they developed several months prior. These meetings will ensure that all students are similarly prepared and "on the same page" upon arrival in Belize.

### **What to Expect in Belize:**

The field expedition begins when you arrive at Belize City's Goldson International Airport. From here, we head to Jaguar Creek, nestled in the rainforest, to spend our first three nights. You'll be housed in a rustic dormitory with shared rooms and spend an exciting two full days visiting the zoo, an archeological site, going cave tubing, and hiking in the rainforest to observe monkeys, birds, and other wildlife. On our third morning, we will take a bus to the town of Dangriga where we will take a boat 40 miles offshore (about 1.5 hours) over the Belizean Barrier Reef to Glover's Reef Atoll. Here, you will be housed in shared dormitories at the Glover's Reef Research Station located on Middle Caye. From the station, you can explore coral reefs and seagrass beds straight from the beach, and you will also have access to sites farther away by boat. Our time at Glover's Reef will focus on identifying common marine organisms, observing coral reef ecology concepts you will have learned in class, and implementing your research projects. We will also go on group snorkeling excursions to special sites within the marine reserve, have group discussions, and partake in evening reflection and relaxation. At both Jaguar Creek and Glover's Reef Research Station, you will be served three delicious Belizean meals a day. On our last full day, we will take a boat to Belize City where we will spend our final night at the Ramada Inn. Here, you will deliver an oral presentation on the results of your research, and we will have a final farewell dinner. The next morning, we will take a bus to the airport and say our goodbyes.

### **Textbook and Readings (Track 1 only):**

- Sheppard, 2021. *Coral Reefs: A Very Short Introduction (2nd ed.)* – get it at [AbeBooks](#), or [Amazon](#)
- Other required readings are assigned in the weekly modules

## What to Bring to Belize:

You are required to bring a mask, snorkel and fins for the field component of the course in Belize. It is **very important** that students test their mask and fins **before** arriving in Belize to make sure that they fit properly, as we will be using these tools daily for our field activities. Each student is also required to keep a field journal ([we recommend a waterproof one, like this](#)) in which to record observations, data, and reflections. A complete list of required and recommended gear is available on Canvas.

## Participation and Grading:

If you are an active participant in this class, you are very likely to earn a good grade! Participation is more than your mere presence during online and field activities. For students in the online course (Track 1), you will be expected to turn in assignments on time, engage fully with the online content, put time and effort into developing a research project, and contribute to online discussions with thoughtful posts. All students (Tracks 1 & 2) are expected to attend and participate in the synchronous online meetings. During the field component, you will be evaluated based on your engagement in individual and group activities, your active participation in the fieldwork for your research project, and your contribution to the success of the course. Your grade will *not* be based on your water-based skills, rather the effort that is put into each activity according to your individual abilities and comfort level. Your final grade for the Track in which you are enrolled will be broken down as follows:

Grade Item	% of total grade
<b>Track 1 (Online + Field; 4 credits)</b>	
Online assignments (including asynchronous discussions)	10%
Online quizzes	10%
Field quiz	10%
Research project	60%
Research Proposal	15%
Field work quality and effort	20%
Presentations (online 5% and final 5%)	10%
Final paper	15%
Participation (online & field)	10%
<b>TOTAL</b>	<b>100%</b>
<b>Track 2 (Field + Preparatory meetings; 2 credits)</b>	
Research project	80%
Field work quality and effort	35%
Presentations (online 5% and final 5%)	10%
Final paper	35%
Field quiz	10%
Participation (field + online)	10%
<b>TOTAL</b>	<b>100%</b>

Grades will be assigned according to the following grading scale: 92-100% = A; 88-91.9% = AB; 82-87.9% = B; 78-81.9% = BC; 70-77.9 = C; 60-70% = D; <60% = F

## Learning Objectives:

Upon completion of this program you will be able to:

- Describe the basic physical and chemical properties of seawater.
- Describe the geomorphology of oceans and how conditions change with depth.
- Explain the causes of waves, tides, and global ocean circulation patterns.
- Understand how abiotic conditions in the oceans influence the biotic communities within them.
- Identify major animal taxa in coastal tropical marine communities, including mangroves, sea grass beds, and coral reefs.
- Describe the ecological characteristics of coastal tropical marine ecosystems and explain the biotic adaptations to them.
- Explain the major threats facing each major marine system, and what everyone can do to combat them.
- Apply ecological concepts in marine science to the design of marine protected areas.
- Develop a hypothesis informed by scientific literature, and write a research proposal to investigate it.
- Apply common marine sampling and research techniques to collect data in a marine environment.
- Analyze and present scientific data orally and in writing.
- Articulate major threats to ocean ecosystems and actions that can be taken to mitigate them.

## Statement on Diversity & Inclusion:

Ceiba values all forms of human and natural diversity, and believe it is a source of creativity, resilience, and strength. With conservation projects in different countries, we at Ceiba understand that it is not possible to fully understand everyone's lived experiences from our own perspectives. We believe the key is to be open to learn about other peoples' experiences, and by doing so enrich both our own and others' lives. We strive to create welcoming, supportive, and inclusive learning environments in our programs, and we ask for participants' help with that. We expect everyone to be respectful, attentive, inclusive, and tolerant of others so together we create a productive learning community. Below is the DEI statement from UW-Madison.

## Academic Integrity:

This course is accredited by the UW-Madison, and Ceiba adopts the same standards for academic integrity. By enrolling in this course, you assume the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university and of your own intellectual development. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which will result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Dean of Students Office for additional review. For more information, refer to:

<https://conduct.students.wisc.edu/academic-integrity/>

## Program Links:

[Program page on Ceiba Foundation for Tropical Conservation website](#)

[Glover's Reef Marine Reserve and Research Station site](#)

[Belize Tourism Board travel information](#)



**CORAL REEF ECOLOGY**  
**Track 1: Online + Field**  
**Online Content Schedule\***  
**June 24 – July 14, 2023**

Week	Topics	Readings/Activities**
<b>Week 1</b>		
<b>June 24 – 30</b>	<b>Zoom Meeting 1: Mon. 6/24 @ noon</b>	Zoom Topic: Orientation to the course and Belize trip
	Introduction to Coral Reefs	Forum 1: Introduce Yourself! Read: Sheppard, Ch. 1-4; Claudino-Sales 2018
	The Ocean Environment	Assignment 1: Belizean Reef Creatures Forum 2: Post your Research Ideas
	Life on the Coral Reef: Foundation species	<b>QUIZ 1 Available 6/28-7/1</b>
<b>Week 2</b>		
<b>July 1 – 7</b>	<b>Zoom Meeting 2: Wed. 7/3 @ noon</b>	Zoom Topic: Discuss Research ideas
	Life on the Coral Reef: Ecological Interactions	Read: Sheppard, Ch. 5-6; Lamb 2017; Cox et al. 2020 Forum 2: Reply to research idea posts
	Marine Invertebrates	Assignment 2: Bibliography
	Mangroves & Seagrasses	<b>QUIZ 2 Available 7/5 – 7/8</b>
<b>Week 3</b>		
<b>July 7 - 14</b>	Reef Fishes	Research methods meetings
	Threats to Coral Reefs	Read: Sheppard, Ch 7-9; MacClanahan & Muthinga 2020
	Conservation of Coral Reefs	Proposal draft DUE Fri. 7/12
	Future of the Seas	<b>QUIZ 3 Available 7/12 – 7/14</b>
	<b>Zoom Meeting 3: Fri. 7/12 @ 3 pm</b>	Zoom topic: Proposal presentations

\* Content is subject to change. A final syllabus with complete content information will be given to you at the start of the course.

\*\* Assignments and Forum posts are due by 10 pm on the due date unless otherwise indicated.



**CORAL REEF ECOLOGY**  
**Tracks 1 & 2**  
**Belize Expedition – Detailed Schedule\***  
**July 19 – August 2, 2024**

Date	Activities
July 19	A.M. Arrival at Belize Airport; meet staff P.M. Transfer to Jaguar Creek, orientation to Belize
July 20	A.M. Rainforest hike P.M. Belize Zoo
July 21	A.M. Xunantunich Maya site P.M. Cave tubing on No’Hoch River Garifuna band
July 22	A.M. Boat transfer to Glover’s Reef; Mangrove viewing P.M. Orientation & introductory snorkel
July 23	A.M. Snorkeling; Fish identification P.M. Snorkeling west side; Field activity
July 24	A.M. Snorkeling ( <i>patch reef or forereef if conditions allow</i> ) P.M. Snorkeling; Invert identification Guest lecture: Management of the Glover’s Reef Marine Reserve
July 25	A.M. Snorkeling ( <i>forereef as conditions allow</i> ) P.M. Project check ins, equipment check out
July 26	<b>Day off</b>
July 27	<b>All day: Work on projects</b>
July 28	<b>All day: Work on projects</b>
July 29	<b>All day: Work on projects</b> <i>Night snorkel (if conditions allow)</i>
July 30	<b>All day: Work on projects</b> <i>Night snorkel (if conditions allow)</i>
July 31	<b>A.M. Field quiz</b> <b>P.M. Project wrap-up &amp; Data analysis</b> Visit Marisol Resort
August 1	A.M. Boat to Belize City (Ramada Inn) P.M. Work on presentations Eve: <b>Project presentations</b> Final dinner!
August 2	A.M. Transfers to airport - Departures 😊

\* This schedule is tentative and subject to change due to weather conditions, availability of transport, desired modifications, and other unpredicted circumstances.