



a nonprofit membership organization dedicated to improving and protecting our coral reef ecosystem
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Virtual Marine Science Classroom

Unit 5: One Ocean (Oceanography)

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Reef Relief Phone Number: 305-294-3100

Course Description: This unit was designed to supplement existing science coursework. Students will learn about oceanography. They will get in depth explanations on the various fields studied within oceanography and learn from experts along the way.

Course Objective:

1. Students will be able to understand the physics, chemistry, and geology of the ocean.
2. Students will be able to understand the important role our oceans have on this planet.
3. Students will gain a better understanding of the natural world.

Attendance:

Students are able to complete this at their own pace. There are no deadlines for materials, and it is up to the student and parent/teacher to keep said student on their desired pace.

Internet Etiquette:

Reef Relief staff has enabled commenting on the materials. The comment sections shall be used to ask legitimate questions or voice formatting/technological issues. Should there be any concern about this please contact us.

Materials:

All course materials and worksheets are provided in an online PDF format. If your student does not have access to a printer, feel free to write down your answers on a separate piece of paper.

Technical Difficulties:

Please contact us via email or phone to let us know about any technical difficulties, we will be more than happy to assist!

Course Work:

Reef Relief has provided many different videos and activities for the students. Students are not required to complete all of the materials in this unit, it is ultimately up to the student, parent or teacher.

Skill Level:

Many activities are labeled Beginner, Medium, or Advanced and it is up to the adult to decide what they would like their student to complete. We recommend the following to evaluate:

- Beginner: Someone new to marine science or is between the ages of 5-8.
- Medium: Someone who has received a moderate amount of science education or between the ages of 9-11.

- **Advanced:** Someone who is comfortable with more in depth science topics or between the ages of 12-17.

Grading:

Reef Relief will not be implementing any grading. Parents and teachers may make the personal decision to grade their student's work. There will be a section labeled answer keys that can be used to check your student's work.

Sharing of Material:

Please do not share classroom materials with others. This includes but is not limited to the class password, the class link, worksheets, video, etc.

Office Hours:

Reef Relief is open Monday- Friday from 10:00 AM until 4:00PM EST. Outside events may change these hours however we will do our best to respond as promptly as possible.

Feedback:

We appreciate your feedback! Please let us know if you have any questions, comments, or concerns by emailing us or posting in the classroom. There is also a survey within the unit you may submit your feedback in.

Unit 5 Syllabus

Pre-Quiz: We encourage every student to take the pre-quiz at the beginning of the course to evaluate their basic knowledge. The information compiled from this quiz will be used for Reef Relief's general knowledge and grant purposes.

Geological Oceanography:

- **Lesson 1: Introduction to Geology**
 - Introduce yourself to geology. Learn the different types of rocks and geologic history.
- **Lesson Notes: Introduction to Geology**
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- **Activity: Rock Detective (Medium)**
 - Test the different rocks around your house and see if you can identify them using the instructions provided. Reef Relief suggests doing this with a parent or adult.
- **Additional Material: Geologic Time**
 - This website has excellent easy to understand graphics and summaries of the major eras in earth's geologic history.
- **Presenter Notes: Introduction to Geology**
 - A copy of the PowerPoint slides to assist with activities.
- **Lesson 2: Geological Oceanography**
 - Learn the various geologic features of the ocean and how they form.
- **Lesson Notes: Geological Oceanography**
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- **Activity: Plate Tectonics Video Activity (All levels)**
 - Watch this video for a review on plate tectonics, and to see an activity you can do at home to mimic the types of plate boundaries. Begin at timestamp 4:09 if you'd like to skip the review of the types of boundaries and begin at the activity.
- **Worksheet: Geological Crossword Puzzle (Advanced)**
 - Match the terms with its definition into the crossword.
- **Additional Resource: Plate Tectonics Video (Beginner to Medium)**
 - Watch this video to get a quick overview of plate tectonics.
- **Presenter Notes: Geological Oceanography**
 - A copy of the PowerPoint slides to assist with activities.

Physical Oceanography:

- Lesson 3: Physical Oceanography
 - An introduction to physical oceanography.
- Lesson Notes: Physical Oceanography
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Worksheet: Ocean Zones Matching (Beginner)
 - Match the correct organism to their ocean zone.
- Worksheet: Ekman's Spiral Model (Medium)
 - Explore the way the Ekman's spiral works.
- Worksheet: Coriolis Effect (Advanced)
 - Create a diagram to show how the Coriolis effect works.
- Bonus Video: How Ocean Currents Work
- Bonus Video: The Coriolis Effect
- Bonus Video: Ekman Spiral
- Bonus Video: Ocean Zones (Beginner)
 - Video to help beginner students learn about ocean zones.
- Presenter Notes: Physical Oceanography
 - A copy of the PowerPoint slides to assist with activities.

Chemical Oceanography:

- Lesson 4: Chemistry Basics
 - Learn some of the basics of chemistry if you have not taken a chemistry class in school.
- Worksheet: Atoms vs molecules (Medium to Advanced)
 - Learn the differences between atoms and molecules.
- Lesson 5: Chemical Oceanography
 - Learn about the chemical interactions that take place in our ocean.
- Lesson Notes: Chemical Oceanography
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Activity: Build a Molecule (Beginner to Advanced)
 - Use fruit, candy, or playdough to create chemical bonds that take place in the ocean.
- Activity: Ocean Acidification Video Activity
 - Watch this mini video to learn more about ocean acidification. Watch then complete the ocean acidification worksheets.
 - Video Worksheet: Ocean Acidification Coloring (Beginner)- Color this worksheet to learn the process of ocean acidification.
 - Video Worksheet: Ocean Acidification Follow Along (Medium)- Fill out the steps as you watch the Ocean Acidification Activity video, or challenge yourself to complete the worksheet from memory after watching.
- Worksheet: Ocean Acidification (Advanced)
 - Learn a little about chemistry and practice seeing what happens when too much carbon dioxide enters the ocean.
- Additional Material: Chemical Bonds (Advanced)
 - This video is a great resource to learn about chemical bonds. It will be mostly beneficial to students who have ALREADY taken a course in chemistry and are familiar with the topic.
- Additional Material: Hydrothermal Vents
 - Learn more about the relationship between the oceans chemistry and hydrothermal vents.
- Interview with a Scientist: Sabrina Ufer
 - Join us as we talk to Sabrina about her studies involving chemical oceanography, ocean acidification, and more.
- Presenter Notes: Chemical Oceanography
 - A copy of the PowerPoint slides to assist with activities.

Biological Oceanography:

- Lesson 6: Biological Oceanography

- Learn about the interactions between living organisms and abiotic factors. Discover how nutrients are cycled in the marine environment.
- Lesson Notes: Biological Oceanography
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Worksheet: Draw an Aquatic Environment (Beginner)
 - Decide what living organisms are in the environment, where they live, and the water conditions.
- Worksheet: Become a Biological Oceanographer (Medium)
 - Write down or tell someone what you would study if you were a biological oceanographer.
 - Make a list of what you're interested in and think about how abiotic factors interact with it.
- Interview with a Scientist: Makenzie Kerr
 - Join us with Makenzie Kerr to learn about DNA barcoding and why it's important to biological oceanography, and collecting metazoan zooplankton (fish eggs) to determine fish spawning sites.
- Movie: The Fate of Carbon
 - Watch this episode of Changing Seas to learn about changes in the environment affecting carbon dioxide storage.
- Presenter Notes: Biological Oceanography
 - A copy of the PowerPoint slides to assist with activities.

Post Quiz: We encourage every student to take the post-quiz at the beginning of the course to evaluate their basic knowledge. The information compiled from this quiz will be used for Reef Relief's general knowledge and grant purposes.

Answer Key: We have provided answers to most worksheet activities and have combined them into this folder for parents and teachers to check their student's work.