Online Courses for High School Students
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Marine Science 1A

From tiny puddles to vast oceans, water allows for processes that impact all things around us from wildlife and the air we breathe to our health and more! In this course, you will examine the essential nature of water and how its special properties support all life on Earth. Through the lens of the Scientific Method, you will engage with scientific inquiry to study aquatic ecosystems and how water, land, and weather all work together to create unique living environments. You will also learn about scientists who were critical to aquatic science and how to form valid and reliable conclusions from your study of water like they did. Let's dive in and see what makes water vital to life.

Prerequisite: None
Course Length: One Semester

Required Materials:

Physical:
Art supplies
Clear container (that can hold four cups of water)
Clear glass
Egg
Four empty water bottles with lids
Helper
Marker
Oil
Paper clip
Salt
Small measuring device (teaspoon, tablespoon, or food scale)
Something to heat water (microwave, kettle, hot plate)
Stir stick
Tape
Thermometer
Two or three cups of table salt
Video recording device

Software:
Google Scholar
Word processing software

Optional:
Audio recording device
Digital camera
Graphic design software
pH papers
Presentation software
Spreadsheet software

Course Outline:

Unit 1: What Is Science?
Science is complex and dynamic while also being strict, methodical, and creative! We can describe and think of science in so many ways, but in order to go deeper into marine science, we'll need to nail down a working definition of science in general. How do we define this broad, all-encompassing term? We will arrive at a definition for science and work through what it means to be a scientist, how to test your ideas and observations scientifically, and how to present them to the world!

Unit 2: The Science of Water
Have you ever heard of the chemical compound dihydrogen monoxide? Every so often, a news outlet or a prank group will post an article or a survey listing the hazards of this chemical, like its ability to corrode and damage metals and the fact that it's a major component of acid rain. While this is all true, it's kind of a manipulation of the truth. Dihydrogen monoxide is simply the chemical name for water! Humidity does corrode metals, and water is obviously a major component of any kind of rain. Luckily for you, you're about to develop such a solid understanding of the science of water that you'll never fall for any kind of dihydrogen monoxide prank!

Unit 3: An Earth of Land and Water
Earth is ever changing and ever moving. Whether it be the consistent shifting of continents, the violent shaking caused by an earthquake, or the fluctuating shapes of erratic coastlines, Earth never seems to rest. Understanding the mechanisms behind each of these processes will leave you with a greater appreciation for the monumental force that is Mother Nature. Grasping these concepts requires that we learn about the scientists, oceans, and landmasses of the past so that we can anticipate how these geological processes may affect our future.

Unit 4: Weather Patterns on the Water
From 1962 to 1963, the Galveston Laboratory of the US Bureau of Commercial Fisheries (now known as the National Oceanic and Atmospheric Administration, or NOAA) released close to 8,000 glass bottles into the Gulf of Mexico. More than 57 years later, a couple walking the beach of Padre Island National Seashore in Corpus Christi, Texas, found one of those bottles. Inside the bottle, they discovered a postcard asking for the date and location the bottle was found. If the postcard was mailed back to NOAA, the couple would receive a $0.50 reward! This experiment was meant to study ocean currents. Luckily, we now have much more sophisticated techniques and tools that help us to understand how the ocean moves. While we may all be familiar with terms like "current," "wave," "tide," and "hurricane," do we truly understand how these concepts describe hydrological movements within aquatic ecosystems? Don't worry—it won't take 57 years to find out!

Marine Science 1a Midterm Exam

Unit 5: Life in the Water
The Great Divide—otherwise known as the Continental Divide of the Americas—determines how water flows as it makes its way from the northern tip of Alaska down through Canada, the United States, and then Mexico. If water falls to the west of the divide, it flows to the Pacific Ocean. If water falls to the east of the divide, it eventually makes its way to the Gulf of Mexico. The ability of water to flow all around the world is what helps life flourish in even the most remote locations. Learning more about aquatic ecosystems and how all bodies of water are connected will help us to understand how vital it is that we advocate for adequate water quality around the globe.

Unit 6: Exploring Aquatic Ecosystems
Imagine you are a fish. What is the first thing you need for survival? Water! Okay, quick—find a body of water. Luckily for you, the vast majority of Earth's surface is covered by water. You could choose to live in the ocean, but where in the ocean would you live? Surface waters? Deep water? Maybe fresh water would be better for you! Even though we aren't fish and won't have to make these choices, learning about the many aquatic ecosystems and the factors that impact whether an organism can live somewhere or not can give you insight into how human activity affects aquatic systems.

Unit 7: How Ecosystems Work
The Great Barrier Reef is one of the seven wonders of the natural world. This sensational underwater environment is a large, sweeping ecosystem that is home to 3,000 coral reefs, each of which is considered its own unique ecosystem. Let's zoom in on one of these smaller ecosystems: A large barracuda lingers overhead as hundreds of tiny damselfish actively feed on algae growing on the reef, a lone tiger shark swerves through the dynamic coral, and many smaller prey fish lunge inside their hiding spots along the living reef. How do all these organisms live harmoniously within the same area? In this unit, we will define all the

interspecies relationships mentioned above—and more!

Unit 8: The Evolution of Aquatic Life

We as humans tend to think of "life" in terms of terrestrial life-forms. However, much of life's history has occurred under water. Approximately 2.3 billion years ago, a microbe known as cyanobacterium was the first known photosynthetic organism to produce gaseous oxygen—a game changer for life on Earth. However, it wasn't until about 252 million years ago that shark and fish ancestors started to populate ocean environments. So, how do we go from cyanobacterium to the intense diversity we see today among plants and animals? The answer is simple: evolution. But just what exactly is this complex process? Let's learn all about it!

Marine Science 1A Final Exam