Unit 01: Introduction to Marine Science

Content Area: **Science**
Course(s):
Time Period: **Marking Period 1**
Length: **2 weeks**
Status: **Published**

Brief Summary of Unit

Students will learn the difference between oceanography and marine biology and their relationships to each other. Students will research and learn about early oceanic exploration and early explorers' contributions to the field of marine sciences. Students will learn the characteristics of ocean water, sampling techniques used today, and how climate change has impacted ocean properties..

June 2024

Essential Questions

Essential Questions:

Which historical achievements of ancient oceanographers helped expand the study of marine science ?

How have innovative technologies and discoveries advanced the study of marine science?

Why is the study and understanding of the properties of seawater so critical in its effects on marine ecosystems?

How has Earth's water budget changed over time?

Enduring Understandings:

The ocean has been studied throughout history.

There are specific techniques used to monitor/measure ocean conditions today

Students Will Know/Students Will be Skilled At

Students will know how to differentiate between oceanography and marine biology.

Students will know the main characteristics of seawater and the sampling techniques used to measure them.

Students will know that seawater is unique because of the substances contained in seawater.

Students will be skilled at analyzing the chief voyages of discovery that led to the developments & discoveries of modern marine science.

Students will be skilled at defining/describing marine biology, oceanography, water budget, water cycle, solubility, and density.

Students will be skilled at describing the water budget of our oceans.

Students will be skilled at describing the water cycle.

Students will be skilled at defining the properties of seawater and how it affects ocean currents.

Learning Plan

Meaningful participation in guided question/answer sessions, individual/group discussions, demonstrating an understanding of the purpose of the unit lesson(s), key terms, and concepts.

Preview the essential questions, provide answers, and connect to learning throughout the unit.

Identify and locate the major oceans of the world and some of the seas.

Explore Marine Science Application in the Real World and Careers in the field.

Google Slides Presentation - What is Marine Science?

Early Explorers worksheet.

Water Budget Google Slides Presentation - Introduction to water and various processes (2 Days).

Water as a buffer lab activity.

Water Density lab from Naval Meteorology and Oceanography Command Homepage.

Exploring Climate Change: Examining the impact Climate Change has had on ocean study and exploration. Case study analysis and internet research assignment.

Evidence/Performance Tasks

Formative Assessments:

Worksheets

Do Nows

Exit Tickets

Class Discussions

Complete daily classwork and regular homework assignments related to the identification of concepts learned in the natural setting, vocabulary, problem solving, and critical thinking.

Graphical analysis of earth's water budget.

Navigation through PowerPoint presentations to differentiate inherent differences between marine biology and oceanography.

Quizzes

Summative:

Midterm/Final Exam

Unit Test - Marine Science

Bench Marks:

SGO: Calculate density and analyze density graphs of various types of ocean water using real and/or synthetic samples

Midterm and Final Exams

Alternative:

Research project of a decade of choice showing who made discoveries in marine science and what kinds of voyages they led/were a part of that allowed for such discoveries to be made

Materials

Textbook, *Essentials of Oceanography (13th Ed.), Trujillo and Thurman*

Earth Science, Merrill, and ancillary resource materials

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quantitative/qualitative lab equipment for activities, experiments

related oceanography maps, ocean current charts

Informational & interactive Website: noaa.gov

Standards

ELA.L.SS.11–12.1	Demonstrate command of the system and structure of the English language when writing or speaking.
MATH.9-12.S.ID.A	Summarize, represent, and interpret data on a single count or measurement variable
MATH.9-12.S.ID.B	Summarize, represent, and interpret data on two categorical and quantitative variables
ELA.L.VL.11–12.3	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, including technical meanings, choosing flexibly from a range of strategies.
MATH.9-12.S.IC.A	Understand and evaluate random processes underlying statistical experiments
MATH.9-12.S.IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies
ELA.RL.CR.11–12.1	Accurately cite strong and thorough textual evidence and make relevant connections to strongly support a comprehensive analysis of multiple aspects of what a literary text says explicitly and inferentially, as well as interpretations of the text; this may include determining where the text leaves matters uncertain.
ELA.W.AW.11–12.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
ELA.W.IW.11–12.2	Write informative/explanatory texts (including the narration of historical events, scientific procedures/experiments, or technical processes) to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
ELA.SL.PE.11–12.1	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
ELA.SL.PI.11–12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
SCI.HS.ESS3.D	Global Climate Change
SCI.HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
SCI.HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
SCI.HS-ESS2-5	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
SCI.HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
SCI.HS-ESS3-6	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).
SCI.HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

SCI.HS-LS2-3	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
SCI.HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
SCI.HS-LS2-1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
SCI.HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
SCI.HS-PS3-4	Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
TECH.9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.
TECH.9.4.12.TL.4	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
TECH.9.4.12.IML.6	Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender, and age diversity (e.g., NJSLSA.SL5).
	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
	Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform the decision-making.
	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
	Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.
	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.
	Accurate information may help in making valuable and ethical choices.

Suggested Strategies for Modification

https://docs.google.com/spreadsheets/d/1BoXlgGboaurkHWyNqQpnIzl77z6Lb7Dg_ExD7n7FQJw/edit?usp=sharing

Additional modifications may be made based on individual needs of students as stated in student IEP (Individualized Education Program) documentation and as observed by the teacher:

Student directed research/presentation (power point, skit, demonstration) - Recent Scientific Contributions.

Design your own lab experiment

modified tests

cooperative learning groups

one-to-one instruction and assistance

additional time on task

alternative outcome options

individualized student assessment

preferential seating

handouts of class materials

guided notes

visual aides

computer web search