

Course Title:	Marine Science ECE
Grade(s):	11th/12th

Course Description
This course is designed to explore the extensive field of oceanography, focusing on the four main branches of ocean geography, ocean chemistry, ocean physics, and movement and marine biology. Students will start the course by learning about the history of the ocean and how it formed. The course will take an in-depth look at technology used in ocean exploration, and students will work hands-on with some of the technology currently utilized in ocean exploration. As the course moves into exploring the four main branches of marine science, we will cover topics such as water chemistry, ocean acidification, waves, tides, currents, tectonic plates, sea floor sediments, marine ecosystems, marine species, and more! This course is designed to align with UConn's MARN 1002/1003 course. Students enrolled in this course are required to complete coursework showcasing experience in marine science according to UConn ECE guidelines and complete various ECE coursework assignments. Students will also complete differentiated assessments.
Approved Curricular Materials/Textbook(s)

Unit Title	Unit Description (Include Unit Objectives)	Unit Pacing
Unit 1: Introduction to Marine Science	This unit is designed to give students an overview of the marine science industry and explain the purpose of studying marine science in human society. Students will: • Explain the various academic disciplines related to oceanography and explain what each area encompasses. • Select college/career areas of interest within the marine science industry. • Explain the driving purposes behind the marine science industry and the agencies that play a key role in accomplishing their goals. • Justify Earth's sustaining and maintaining a liquid ocean based on characteristics specific to our planet.	2 weeks

	• Determine what features of the ocean made it a good environment to have nurtured early life. • Compare and contrast Earth's oceans with oceans on other planets and moons.	
Unit 2: Ocean Exploration	This unit will cover exploration methods used to learn more about the ocean. The unit will start with the history of ocean exploration and work towards the recent technological developments utilized in ocean exploration. Students will: • Explain the historical significance of early voyaging, seafaring nations, and important individuals on early marine science developments. • Compare different technologies utilized in ocean exploration today. • Evaluate the impact government-sponsored voyages had on the field of oceanography. • Outline the role institutions and international collaborations play in further developing the field of oceanography. • Utilize an ROV for exploration.	2 weeks
Unit 3: Ocean Geology	This unit will cover ocean geography, starting from the plate tectonic theory and covering how the current seafloor topography developed and what features are currently present. Students will: • Explain the theory of plate tectonics and how it has reshaped Earth's surface over time. • Explain the driving forces that allow plates to shift. • Identify the different types of plate boundaries and the crustal features that result from each. • Explore the topography of the ocean floor and determine how this topography creates different habitats suitable for marine life. • Compare and contrast various marine sediments, their formation, characteristics, sources, distributions, and impact on the surrounding water and organisms.	4 weeks

Unit 4: Ocean Chemistry	This unit will focus on the chemical properties of saltwater and how to measure those properties. There will also be a focus on how the chemical properties of the ocean have been changing and the impact of those changes on marine organisms. Students will: • Explain how salinity affects water's properties. • Utilize appropriate tools to measure chemical properties of saltwater, such as temperature, salinity, specific gravity, pH, dissolved oxygen, and ammonia. • Relate changes in pH to dissolved gas concentrations and biological processes in both saltwater and freshwater. • Describe how a change in ocean pH can affect some marine organisms. • Explain how organizations are working to reduce the impact of ocean acidification.	3 weeks
Unit 5: Ocean Movement and Physical Oceanography	This unit will cover various aspects of physical oceanography, including tides, circulation, waves, and atmosphere. The unit will look at how the atmosphere and global wind patterns affect circulation, weather, and climate patterns throughout the ocean. We will take a look at the driving forces behind ocean currents, their formation, and the effects they have on weather and climate. The unit will also explore characteristics of waves and tides and the impact and role they play in the ocean. Students will: • Explain how the ocean and the atmosphere interact with each other. • Identify the causes of ocean currents and explain why surface currents follow the pattern they do. • Describe the characteristic features of different boundary currents within a gyre and what is responsible for these differences. • Compare and contrast waves and currents in terms of what they move and how a floating object would be affected by each. • Explain the physical characteristics of waves and how those characteristics are impacted by wavelength and depth of water. • Explain why Earth has two tidal bulges. • Describe how the relative position of the moon, sun, and Earth affects tidal	4 weeks

	range over the course of a month. • Discuss how the tides affect the life history characteristics of some organisms. • Explain how surface currents, circulation patterns, and waves can influence regional weather and climate.	
Unit 6: Marine Biology	This unit will focus on marine animals and their habitats. Students will study marine ecosystems and their impacts. Students will take an in-depth look at marine communities, including salt marshes, estuaries, kelp forests, coral reefs, open ocean, deep-sea floor, hydrothermal vents, whale-fall, and intertidal zones. In each community, students will identify food webs, characteristics, and appearance of the land/water, identify common species found there, explain the living conditions present, analyze threats to the community, and find local/specific community examples. Students will: • Explain what a marine ecosystem is. • Explain the different types of relationships that exist among organisms within marine communities. • Classify marine animals based on their physical characteristics. • Discuss the primary factors that affect marine community composition. • Compare and contrast the various marine communities. • Explain the type of diversity found throughout marine communities. • Explain the primary challenges each type of marine community is currently facing.	5 weeks