OUTCOMES BASED LEARNING MATRIX

Course: BIOL 144 The Natural Resources of Coastal New England   **Department:**   Biology

Course Description; Content will focus primarily on the living resources in Stellwagen Bank National Marine Sanctuary, the only national marine sanctuary in the northeast which is located at the mouth of Massachusetts Bay. Additional lectures will cover regional geology, oceanography, water quality, marine technology and ocean policy. National Marine Sanctuaries are ocean and Great Lakes sites that have been deemed by Congress to hold special national significance. Each week one or two guest lecturers/specialists, who are experts in their fields, will provide information on the status of specific resources and review pertinent research topics.

Prerequisites: One unit of high school science is recommended, preferably Biology, and Preparing for College Reading II (ENGL092), Introductory Writing (ENGL099), and Fundamentals of Mathematics (MATH010), or waiver by placement testing results, or Departmental Approval

The individual outcomes listed in the first column answer the question: **What must the learner know and be able to do at the end of the course?** Items in the third column should answer the question: **How do we know?** The second column is where teachers can be most creative; it's for pedagogy. Each rectangle in column one contains just one outcome; the corresponding rectangles in columns two and three, however, may contain more than one item.

The code indicates the core competencies being strengthened by the outcomes activities and the assessment tools.
Critical Thinking (CT); technology skills (TS); oral communications (OC); quantitative skills (QS); reading (R); writing (W).

COURSE OUTCOMES	OUTCOMES ACTIVITIES	ASSESSMENT TOOLS
Describe the National Marine Sanctuary system and locate at least five sites within the system.	• Read article (CT,R) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W)
Explain the geological history of the Gulf of Maine and the coast of Massachusetts, and locate various marine features, including Stellwagen Bank, Georges Bank, Jeffreys Ledge, Stellwagen Basin and Tillies Basin.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W)
Explain how and when Stellwagen Bank was discovered, by whom, and why it was considered a significant achievement.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W)
Describe prevailing currents in the Gulf of Maine and Massachusetts Bay.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W) • Response paper 2 (CT, R, W)
Explain water column discontinuities, such as thermoclines and haloclines, and how they affect Massachusetts Bay on a seasonal basis.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W) • Response paper 2 (CT, R, W)
Explain meteorological phenomena that affect Massachusetts Bay, including northeasters and hurricanes, sea states and wind speeds.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W) • Response paper 2 (CT, R, W)
Name at least two types of phytoplankton and five types of zooplankton that can be found at Stellwagen Bank.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W)
Name six species of cetaceans that visit the Stellwagen Bank National Marine Sanctuary, describe their status, migratory patterns, and feeding behaviors.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W) • Term Paper (CT, R, W)
Identify ten common fishes of the Stellwagen Bank area and describe the types of habitats they utilize.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W) • Term Paper (CT, R, W)

List eight major invertebrate phyla that can be found in the sanctuary, describe characteristics of each phylum, and specify at least one species from each phylum.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W) • Term Paper (CT, R, W)
Identify at least five seabird species that can be found in the sanctuary during the summer and winter.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W) • Term Paper (CT, R, W)
Explain the differences between marine and terrestrial biodiversity.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W)
Explain the differences between food webs in boreal, temperate and tropical regions, and be able to construct a simple food web for the Stellwagen Bank area.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT) • Food Web Activity (CT, R, QS, TS)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W) • Food Web Activity (CT, R, QS, TS)
Describe at least three threats to biodiversity in the ocean.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT, R, W) • Response paper 1 (CT, R, W)
Read a bathymetric map of the Gulf of Maine, and locate geographical and navigational features, including seafloor contours, buoys, and shipping lanes.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT) • Map Activity (CT, QS, TS)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W) • Map Activity (CT, QS, TS)
Access on-line satellite and buoy data for the Stellwagen Bank area.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT) • Map Activity (CT, QS, TS) • Data Analysis (CT, QS, TS)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W) • Map Activity (CT, QS, TS) • Data Analysis (CT, QS, TS)
Describe at least two resource management issues confronting the Stellwagen Bank National Marine Sanctuary.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W) • Response paper 1 (CT, R, W
Explain global change issues that will affect the sanctuary, including ocean warming, ocean acidification and sea level rise.	• Read article (CT,R) • Answer pre-discussion questions (CT,R, W) • Attend discussion (W,OC,CT)	• Quizzes and exams (CT,R,W) • Pre-discussion Questions (CT,R, W) • Response paper 1 (CT, R, W)

To strengthen Core Competencies in order to increase success in this and other courses and in the workplace.	Referenced above	Referenced above.