September 2006
OUTCOMES BASED LEARNING MATRIX

Course: Introduction to Marine Biology **Department: Biology**

While completing the table below, remember that the individual outcomes you list in the first column should answer this 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 should contain just one outcome; the corresponding rectangles in columns two and three, however, may contain more than one item. Using the code at the end of the matrix, indicate the core competencies being strengthened by the outcomes activities and the assessment tools.

*COURSE OUTCOMES	OUTCOMES ACTIVITIES	ASSESSMENT TOOLS
Marine Environment To learn basic chemical and physical properties of ocean water in order to understand how abiotic factors affect marine organisms	Read text (CT,R) Attend lecture/discussion (W,OC,CT) See films (CT) Labs (CT, R, W, TS, QS)	Labs: Properties of Seawater (CT,R,W,TS, QS) Films: Biology of Seashore; Biology of the Banks (CT) Quiz & Test (CT,R,W)

Classification To survey major groups of marine organisms to understand the process of evolution and the unity and diversity of life. To learn the basic life histories of major groups of marine organisms so students can understand the processes of growth and reproduction and the importance of sexual reproduction to the evolution of the species.	Read text (CT,R) Attend lecture/discussion (W,OC,CT) See films (CT) Dichotomous keys (CT, R) Labs (CT, R, W, TS)	Films: Biology of Algae; Biology of Cnidarians; Biology of Echinoderms; Eyewitness Fish; Penguins; Northern Right Whale; Whales and Marine Mammals (CT) Labs: Classification; Phytoplankton; Plants; Saltmarsh Plants and Zonation; Lower Invertebrates; Higher Invertebrates; Fishes; Marine Birds; Marine Mammals (CT,R,W,TS) Quiz & Test (CT,R,W) Practical Exam (CT, R, W)

Ecology To learn basic ecological concepts such as energy flow and chemical cycling so that students can appreciate the interrelationships among organisms and their environments. To learn basic relationships between organisms and their environments and between organisms and other organisms so that students can appreciate their value in the ocean ecosystems.	Read text (CT,R) Attend lecture/discussion (W,OC,CT) See films (CT) Labs (CT, R, W, TS, QS) Tank Projects (CT, R, W, TS, QS)	Films: Biology of Seashores; Bounty of the Banks; Penguins; Northern Right Whale Labs: Introduction to Estuaries; Saltmarsh Plants and Zonation; Phytoplankton; Fishes; Marine Birds(CT,R,W,TS, QS) Quiz & Test (CT,R,W) Tank Projects (CT, R, W, TS, QS)

Marine Mammals To learn the major groups of marine mammals, their life history, ecology and conservation so that students can appreciate their value in the web of life.	Read text (CT, R) Read articles (CT, R) Attend lecture/discussion (W, OC, CT) See films (CT) Labs (CT, R, W, TS) Essay (CT, R, W)	Films: Bounty of the Banks; Northern Right Whale; Whales and Marine Mammals; Saving Baby Whales; Whales in Crisis (CT) Labs: Marine Mammals (CT, R, W, TS) Essay (CT, R, W)

Human Relationships with Marine Environment To be able to describe the relationships of humans to the marine environment so that students can appreciate the value of the ocean and its resources.	Read text (CT, R) Attend lecture/discussion (W, OC, CT) See films (CT) Labs (CT, R, W, TS) Essay (CT, R, W)	Films: Bounty of the Banks; Northern Right Whale; Whales and Marine Mammals; Whales in Crisis (CT) Labs: Marine Mammals (CT, R, W, TS) Essay (CT, R, W)
Communities To compare and contrast selected local ecosystems so that students can apply their knowledge of marine plants and animal life cycles to particular environments.	Read text (CT, R) Attend lecture/discussion (W, OC, CT) See films (CT) Labs (CT, R, W, TS) Tank Projects (CT, R, W, TS, QS)	Films: Biology of Seashores; Bounty of the Banks (CT) Labs: Intro to Estuaries; Saltmarsh Plants and Zonation (CT, R, W, TS) Tank Projects (CT, R, W, TS, QS)

Laboratory Skills		
To work safely in the laboratory and follow simple laboratory protocols in order to work cooperatively to complete laboratory exercises and conduct experiments.	Read Lab Safety Recommendations (CT,R)	All lab experiments (QS,CT,R,W,TS)
To be able to use dissecting and compound microscopes to observe cells and organisms in order to develop good techniques in preparation for more advanced courses.	Labs (CT,R,W,TS)	Labs: Microscope; Classification; Phytoplankton; Lower Invertebrates; Higher Invertebrates; Fish (CT,R,W,TS)
To learn basic lab skills such as use of basic labware, measuring, performing environmental parameter tests to develop good lab technique.	Labs (CT,R,W,TS, QS) Tank Projects (CT, R, W, TS, QS)	Labs: Properties of Seawater; Microscope; Phytoplankton; Lower Invertebrates (CT, R, W, TS, QS) Tank Projects (CT, R, W, TS, QS)
To be able to use dichotomous keys to identify organisms; to compare and contrast physical features to sharpen student observation skills.	Read text (CT, R) Labs (CT,R,W,TS)	Labs: Classification; Phytoplankton; Plants; Lower Invertebrates; Higher Invertebrates; Fish; Marine Birds; Marine Mammals (CT,R,W,TS) Practical Exam (CT, R, W)
Study Skills		

To apply a study skills method to learning biology in order to improve success in an academically rigorous course.	Attend lecture/discussion (W,CT,OC)	All Quizzes & Tests (R,W,CT) Practical Exam (R, W, CT)

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

*Try to express an outcome as an infinitive phrase that concludes this sentence: **At the end of the course, the students should be able to . . ..** Finding the line between too general and too specific can be difficult. In an English Composition course, for instance, it is probably too general to say, "The student should be able to write effective essays." It is probably too specific to say, "The student should be able to write an introductory paragraph of at least 50 words, containing an attention-getting device, an announcement of the narrowed topic, and an explicit thesis sentence." Just right might read, "The student will write introductions that gather attention and focus the essay."

**Indicate the Core Competencies that apply to the outcomes activities and assessment tools: Critical Thinking (CT); technology skills (TS); oral communications (OC); quantitative skills (QS); reading (R); writing (w).