
Outline Syllabus for Marine Science

UNIT 1: History of Oceanography

- Lecture 1:1 Marine Science and Career Opportunities
- Lecture 1:2 Historical Perspectives
- Lecture 1:3 Modern Oceanographic Institutes
- Lecture 1:4 Water Safety, SCUBA, Navigational Aids, Semaphore, Nautical Terms
- Lab #1 Oceanographic Terms and Equipment
- Lab #2 Snorkeling and Swimming Safety

UNIT 2: Ocean Geology

- Lecture 2:5 Plate Tectonics
- Lecture 2:6 Pangaea
- Lecture 2:7 Bathymetry of the Ocean Floor
- Lecture 2:8 A Titanic Disaster
- Lab #3 Crustal Plates
- Lab #4 The Pangaea Puzzle
- Lab #5 Oceanic Model and Profile Map
- Lab #6 Finding the Titanic

UNIT 3: Navigation

- Lecture 3:9 Basic Navigation
- Lecture 3:10 Course Plotting and Types of Maps
- Lecture 3:11 Dead Reckoning
- Lab #7 Basic Navigation
- Lab #8 Oceanic Contour Mapping
- Lab #9 Course Plotting and Dead Reckoning
- Lab #10 Canoe Trip

UNIT 4: Water Chemistry

- Lecture 4:12 Physical Properties of Water
- Lecture 4:13 Chemical Properties of Water and Dissolved gases
- Lecture 4:14 Effects of Light and Turbidity
- Lecture 4:15 Pressure and Molecular Arrangement
- Lab #11 Comparative Analysis of Water
- Lab #12 Properties of Water
- Lab #13 Oceanographic Field Techniques

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UNIT 5: Marine Ecology

- Lecture 5:16 Marine Ecology Terms
- Lecture 5:17 Energy Relationships
- Lecture 5:18 Building Ecosystems and the Sea as a Resource
- Lecture 5:19 Destroying Ecosystems
- Lab #14 Marine Ecology
- Lab #15 Sea Grass Productivity
- Lab #16 Oil Spill
- Lab #17 Acid Deposition Bioassay
- Lab #18 Water Quality Analysis
- Lab #19 Thermal Pollution

UNIT 6: Pelagic Zone

- Lecture 6:20 Phytoplankton
- Lecture 6:21 Zooplankton and Vertical Migration
- Lecture 6:22 Taxonomy
- Lecture 6:23 Order Cetacea - Whales, Dolphins and Porpoises
- Lab #20 Algal Chromatography
- Lab #21 Phytoplankton
- Lab #22 Zooplankton
- Lab #23 Meroplankton
- Lab #24 Identifying Plankton in a Water Sample
- Lab #25 Developing a Dichotomous Key
- Lab #26 Marine Mammals Key

UNIT 7: Polar Seas

- Lecture 7:24 Polar Seas and History of Polar Exploration
- Lecture 7:25 Pinnipeds and Otters
- Lecture 7:26 Currents
- Lecture 7:27 Penguins and Auroras
- Lecture 7:28 El Nino and La Nina
- Lab #27 Polar Seas WebQuest

UNIT 8: Coral Reefs

- Lecture 8:29 Reef Habitats and Reef Zones
- Lecture 8:30 Phylum Porifera and Phylum Cnidaria
- Lecture 8:31 Class Osteichthyes - Bony Fish
- Lecture 8:32 Mangroves
- Lab #28 Characteristics of Porifera and Cnidaria
- Lab #29 Dissection of a Bony Fish and Cookout
- Lab #30 Coloring Reef Fish

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UNIT 9: Benthic Zone

- Lecture 9:33 Benthic Zone and Hydro-thermal Vent Communities
- Lecture 9:34 Adaptations of Benthos
- Lecture 9:35 Phylum Mollusca
- Lab #31 Bioluminescence
- Lab #32 Benthic sediments
- Lab #33 Comparative Study of Mollusks
- Lab #34 Shell Collecting

UNIT 10: Rocky Coasts

- Lecture 10:36 Rocky Coasts
- Lecture 10:37 Phylum Arthropoda and Phylum Echinodermata
- Lecture 10:38 Tides
- Lab #35 Comparative Study of Crustaceans
- Lab #36 Dissection of Starfish
- Lab #37 Sea Urchin Embryology
- Lab #38 Using the 24-Hour Clock
- Lab #39 Tide Tables
- Lab #40 Tide Frequency and Range
- Lab #41 Tidal Currents

UNIT 11: Sandy Beaches

- Lecture 11:39 Sandy Beaches
- Lecture 11:40 Waves
- Lecture 11:41 The Grain Drain
- Lecture 11:42 Class Aves - Marine Birds
- Lecture 11:43 Marine Reptiles
- Lab #42 Building a Sand Bank and Dune Model
- Lab #43 Examination of a Bird Wing
- Lab #44 Coloring Marine Birds
- Lab #45 Skeletal Comparison of Marine Reptiles

UNIT 12: Estuaries and Nekton

- Lecture 12:44 Estuaries
- Lecture 12:45 Order Sirenia - Manatees
- Lecture 12:46 Class Chondrichthyes: Sharks and Rays
- Lab #46 Shark Dissection

Detailed Syllabus for Marine Biology and Oceanography

Unit 1: History of Oceanography

Day

- 1 Course syllabus, guidelines, grading scale, note-taking, class resume
HW: Put your lab manual and spiral notebook or paper in a three-ring binder to bring with you every day. Write your name in the lab manual and your notebook
- 2 Lecture 1:1 Marine Science and Career Opportunities
How to effectively use your textbook and class notes; Success Tips
Lab Safety procedures
HW: Label the oceans on page A of the lab manual.
On page B, look up the 23 names of Oceans and Seas.
Write them on a separate sheet in your notebook.
Do not write the names on page B as that map will be used later.
- 3 Lecture 1:2 Historical Perspectives
- 4 Lecture 1:3 Oceanographic Research Institutes
- 5 Film *1: "Pioneer of the Sea" - Life of Jacques Cousteau
- 6 Film continued
- 7 Lecture 1:4 Water Safety, SCUBA, Navigational Aids, and Semaphore
- 8 Activity: Lab #1 - Oceanographic Terms and Equipment
HW: Review oceans on page B by saying them out loud
- 9 Lab #1 continued: Using equipment for local water testing
Allow students to use the equipment shown in Lab #1 such as a secchi disk, thermometer, sediment screen, hydrometer, water collecting bottle and plankton net to take measurements in a local creek or stream.
- 10 Lab #2 Snorkeling and Swimming Safety
Actual snorkeling and swimming are not required for reviewing safety rules, but can be fun if the situation is available in a school pool or other area with lifeguards.
- 11 Class review will consist of going over labs and homework that will be graded and returned to you the day before the test. No late work will be accepted. Correct the answers as we go over them.
HW: Study for test
- 12 UNIT 1 TEST

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Unit 2: Ocean Geology

Day

- 1 Lecture 2:5 Plate Tectonics and Types of Plate Boundaries;
Identifying major trenches on page C; Use page C to color code the 8 major lithospheric plates
- 2 Film *2: "Living Planet Series - The Building of the Earth"
- 3 Lab #3 - Crustal Plates
HW: Cut out the continental pieces on pages 19 and 23, place them in separate envelopes and bring to class for Day 5
- 4 Lecture 2:6 Pangaea - Continental Drift and Sea Floor Spreading
- 5 Lab #4 – The Pangaea Puzzle
- 6 Lecture 2;7 Ocean Basin Topography Including Naming Specific Features
HW: Do page 31 in lab manual
- 7 Lab #5 - Oceanic Model and Profile Map
- 8 Cooperative Group Learning: Ocean Floor Maps
- 9 Lecture 2:8 Titanic Disaster
- 10 Film*3: "Secrets of the Titanic" by National Geographic
- 11 Lab #6 - Finding the Titanic
Remember: This is the last day to turn in make-up work for this unit.
HW: Prepare for the review
- 12 Class review for the test, labs returned.
HW: Study for test
- 13 UNIT 2 TEST

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Unit 3: Navigation

Day

- 1 Lecture 3:9 Basic Navigation
- 2 Lab #7 – Basic Navigation - Do only down to the section on Dead Reckoning. HW:
Finish the lab
- 3 Lecture 3:10 Course Plotting and Types of Maps
- 4 Lab #8 - Oceanic Contour Mapping
- 5 Cooperative Group Learning: Using and Reading Navigational Charts
- 6 Lab #9 – Course Plotting and Dead Reckoning
Begin on page 43 and stop at the section on dead reckoning
- 7 Lecture 3:11 Getting a Dead Reckoning Fix
- 8 Lab #9– Course Plotting and Dead Reckoning
Begin with dead reckoning in the middle of page 47
- 9 Lab #10 - Canoe Trip - piloting skills will be used
Remember: This is the last day to turn in make-up work for this unit.
HW: Prepare for the review
- 10 Class review for the test, labs returned.
HW: Study for test
- 11 UNIT 3 TEST

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Unit 4: Water Chemistry

Day

- 1 Lecture 4:12 Physical Properties Including Temperature, Salinity, and Density
- 2 Lab #11 - Comparative Analysis of Water
- 3 Lecture 4:13 Chemical Properties and Dissolved Gases
- 4 Lecture 4:14 Effects of Light and Turbidity
- 5 Lab #12 - Properties of Water
- 6 Lecture 4:15 Pressure and Molecular Arrangement
- 7 Lab #12- continued
- 8 Procedures for Lab #13 and student groups
HW: Read Lab #13
- 9 Lab #13 - Oceanographic Field Techniques
- 10 Lab #13 - Day 2 (optional)
Remember: This is the last day to turn in make-up work for this unit.
HW: Prepare for the review
- 11 Class review for the test, labs returned.
HW: Study for test
- 12 UNIT 4 TEST

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Unit 5: Marine Ecology

Day

- 1 Lecture 5:16 Marine Ecology Terms for Habitats and Niches
- 2 Activity: Lab #14 - Marine Ecology: Building a food web (part 1)
- 3 Lecture 5:17 Energy Relationships
Methods for Determining Productivity in Marine Ecosystems
- 4 Activity: Lab #14 - Convert a food web into trophic pyramid and calculate net productivity (part 2)
- 5 Lecture 5:18 Building Ecosystems and the Sea as a Resource
- 6 Lab #15 Sea Grass Productivity
- 7 Lecture 5:19 Destroying Ecosystems
- 8 Film *4: "Outrage at Valdez" or "Symbiosis - Living Together"
- 9 Lab #16 - Oil Spill
- 10 Lab #17 - Acid Deposition Bioassay
- 11 Lab #18 - Water Quality Analysis
- 12 Lab #19 - Thermal Pollution
Remember: This is the last day to turn in make-up work for this unit.
HW: Prepare for the review
- 13 Class review for the test, labs returned.
HW: Study for Test
- 14 UNIT 5 TEST

Detailed Syllabus for Marine Science and Oceanography

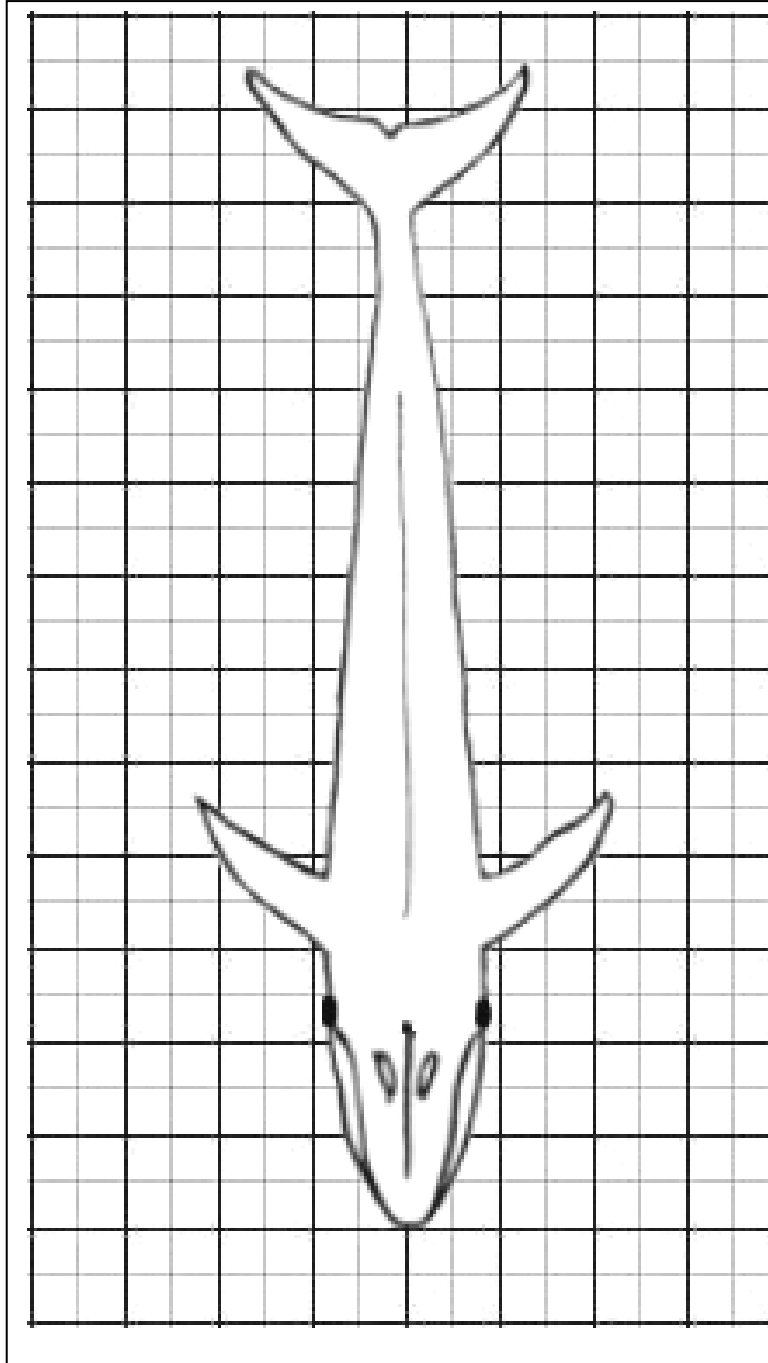
Unit 6: Pelagic Zone

Day

- 1 Lecture 6:20 Phytoplankton as Dominants in the Pelagic Zone
- 2 Lab #20 - Algal Chromatography
- 3 Lab #21 - Phytoplankton
- 4 Lecture 6:21 Zooplankton and Vertical Migration
- 5 Lab #22 - Zooplankton
- 6 Lab #23 - Meroplankton
- 7 Activity: Using a Plankton Net
- 8 Lab #24 - Identifying Plankton in a Water Sample
- 9 Algae Concentration Game -
- 10 Lecture 6:22 Taxonomy and Classification
- 11 Lab #25 – Developing a Dichotomous Key
- 12 Lecture 6:23 Characteristics of Cetaceans as Marine Mammals - Part 1
- 13 Lab #26 - Marine Mammals Key
- 14 Lecture 6:23 Remainder of notes on Cetaceans – Part 2
- 15 Cooperative Group Learning: "A Whale of a Time" – see following page for instructions
- 16 Film *5: "Magnificent Whales or "Ocean World"
Remember: This is the last day to turn in make-up work for this unit.
HW: Prepare for the review
- 17 Class review for the test, labs returned.
HW: Study for Test
- 18 UNIT 6 TEST

Outline of a 100-ft Long Blue Whale

Each $\frac{1}{4}$ inch grid represents 4 inches.



Cooperative Group Learning: "A Whale of a Time" - Meet students on the football field

Materials: one-100 foot tape measure; each group should have their own outline drawing of a Blue Whale, meter sticks, and 50 feet of line or rope.

Use the drawing provided of the top view of a Blue Whale. Divide the perimeter of the whale into the number of groups that you have. Give each group the same picture of the whale with their sections color coded so they will know which part of the whale they are to outline by laying a section of rope on the football field.

On the football field, use stakes to indicate the beginning point and the end of the whale. Use a 100-foot tape measure to mark off the mid-line of the whale near the center of the football field.

Give each group of students 50 feet of rope. Groups will use the rope to outline the shape of their section. All of the ropes should form a continuous outline. Students should calculate where their section begins and ends and far from the mid-line their section should begin and end.

Have students go up into the bleachers to see the full effect! How many students can stand in the tail section or on one flipper?

Detailed Syllabus for Marine Science and Oceanography

Unit 7: Polar Seas

Day

- 1 Lecture 7:24 Polar Seas and the History of Polar Exploration
- 2 Film *6: "Arctic Kingdom" or "Frozen Seas"
- 3 Lecture 7:25 Pinnipeds and Otters
- 4 Comparison Chart of Cetaceans to Pinnipeds - see Lecture Notes on Pinnipeds 7:25E
- 5 Lecture 7:26 Effect of Current Gyres
- 6 Identification of the Major Currents page D Lab Manual
Demonstration of current gyres – see Lecture Notes on Currents 7:26D
HW: Complete the Comparison of Currents Chart from the Lecture Notes 7:26C
- 7 Lab #27 – Polar Seas WebQuest
- 8 Lecture 7:27 Penguins and Auroras
- 9 Film *7: Penguins - "Emperors of Antarctica" or David Attenborough's "Antarctic: An Exploration of Life in the Freezer"

Remember: This is the last day to turn in make-up work for this unit.
HW: Prepare for the review
- 10 Lecture 7:28 El Nino and La Nina
- 11 Class review for the test, labs returned.
HW: Study for Test
- 12 UNIT 7 TEST

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Unit 8: Coral Reefs

Day

- 1 Lecture 8:29 Reef Habitat and Reef Zones
- 2 Film *8: "Jewels of the Caribbean" or "Coral Seas"
- 3 Cooperative Group Learning: Comparison chart between Polar and Coral seas
See Lecture 8:29D Coral Reef
- 4 Lecture 8:30 Phylum Porifera and Phylum Cnidaria
- 5 Lab #28 - Characteristics of Porifera and Cnidaria
- 6 Lecture 8:31 Class Osteichthyes - Bony Fish
- 7 Activity: Lab #29 – Teacher Dissection of a Bony Fish and Cook-Out
see Lab #29 in the Teacher’s Manual for directions
- 8 Lab #29 – Dissection of a Bony Fish and Cook-Out
Student dissection of a fish head
- 9 Lab #30 - Coloring Reef Fish
- 10 Lecture 8:32 Mangroves
- 11 Finish Lab #30
Remember: This is the last day to turn in make-up work for this unit.
HW: Prepare for the review
- 12 Class review for test, labs returned.
HW: Study for Test
- 13 UNIT 8 TEST

Detailed Syllabus for Marine Science and Oceanography

Unit 9: Benthic Zone

Day

- 1 Lecture 9:33 Benthic Zone and Hydro-thermal Vent Communities
- 2 Lab #31 - Bioluminescence
- 3 Film *9: "The Deep"
- 4 Lab #32 - Benthic Sediments
- 5 Lecture 9:34 Adaptations of Benthos
- 6 Lab #34 - Shell Collection
Color shells or make a taxonomic key for shells - student's choice!
- 7 Activity: Bingo - A Shell Game - see Lab 34 in the Teacher's Manual
- 8 Lecture 9:35 Phylum Mollusca
- 9 Lab #33 - Comparative Study of Mollusks
- 10 Finish Lab #33 - Eat your Lab!
Remember: This is the last day to turn in make-up work for this unit.
HW: Prepare for the review
- 11 Class review for test, labs returned.
HW: Study for Test
- 12 UNIT 9 TEST

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Unit 10: Rocky Coasts

Day

- 1 Lecture 10:36 Rocky Coasts
- 2 Lecture 10:37 Phylum Arthropoda and Phylum Echinodermata
- 3 Lab #35 - Comparative Study of Crustaceans
- 4 Lab #36 - Dissection of Starfish
- 5 Lab #37 - Sea Urchin Embryology
- 6 Film *10: "Tide Pools" or "Tidal Seas"
- 7 Lecture 10:38 Tides
- 8 Explanation of the 24-hour clock
Lab #38 - Using the 24-Hour Clock
- 9 Lecture 10:38 Tides (continued)
- 10 Lab #39 - Tide Tables
- 11 Lab #40 – Tide Frequency and Range: Using the Graphing Calculator or Excel
- 12 Lab #41 - Tidal Currents
Remember: This is the last day to turn in make-up work for this unit.
HW: Prepare for the review
- 13 Class review for test, labs returned.
HW: Study for Test
- 14 UNIT 10 TEST

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Unit 11: Sandy Beaches

Day

- 1 Lecture 11:39 Sandy Beaches
- 2 Lecture 11:40 Waves
- 3 Lab #42 – Building a Sand Bank and Dune Model
- 4 Lecture 11:41 The Grain Drain
- 5 Film *11: Marine Birds - “Birds of North America 2” or “Coasts
- 6 Lecture 11:42 Class Aves - Marine Birds
- 7 Lab #43 - Examination of a Bird Wing
- 8 Lab #44 - Coloring Marine Birds
- 9 Finish Lab #44
- 10 Lecture 11:43 Marine Reptiles
- 11 Lab #45 - Skeletal Comparison of Marine Reptiles
- 12 Film *12: “Crocodiles and Alligators”
Remember: This is the last day to turn in make-up work for this unit.
HW: Prepare for the review
- 13 Class review for test, labs returned.
HW: Study for Test
- 14 UNIT 11 TEST

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Unit 12: Estuaries and Nekton

Day

- 1 Lecture 12:44 Estuaries
- 2 Film *13: Manatees - "Endangered Mermaids"
- 3 Lecture 12:45 Manatees
- 4 Film *14: "Sharks: The Ultimate Guide"
- 5 Lecture 12:46 Class Chondrichthyes
- 6 Using a Taxonomic Key to Identify Common Sharks
Internal Anatomy Comparison of Sharks to Bony Fish - see page 214
- 7 Pre-Lab on Sharks – draw the shark on page 209 of the lab manual.
- 8 Lab #46 - Shark Dissection: external characteristics
- 9 Lab #46 - Shark Dissection: abdominal cavity and reproductive systems
- 10 Lab #46 - Shark Dissection: heart, brain, and eye
Remember: This is the last day to turn in make-up work for this unit.
HW: Prepare for the review
- 11 Class review for test, labs returned.
HW: Study for Test
- 12 UNIT 12 TEST and Shark Lab Practical Exam