



Teacher Information and Guidelines

Ocean Lab

Overview

Students learn how to think like scientists, brainstorm with their classmates, and make detailed observations by examining organisms from the rocky intertidal ecosystem. Students will apply the scientific method while using identification keys and completing a squid dissection. They will explore five phyla of marine animals: Arthropoda, Mollusca, Cnidaria, Echinodermata, and Chordata. MSI offers this program as two different options: at the MSI facility, or as a modified Inland Voyage program in the classroom.

Option 1: Ocean Lab at MSI

This Ocean Lab program takes place at the Marine Science Institute in Redwood City. In addition to studying five phyla of marine animals, students will also participate in a squid dissection to gain a better understanding of the phylum mollusca.

Option 2: Ocean Lab Inland Voyage

This Ocean Lab program takes place at the student's own school. The squid dissection is excluded from this program due to transportation and disposal needs.

Option 1: Ocean Lab at MSI

Pre-Visit Checklist

- **Please review the invoice.** Note the deposit due date; your deposit must be received by that date in order to hold your reservations. A purchase order will be accepted in lieu of a deposit.
- **Make sure you understand the cancellation policy.**
- **Make sure program balance is paid.**
- **Arrange for chaperones.** MSI requires the assistance of **one adult per ten students.** These adults will assist the students at each station. They do not need to have a science background, but they should be enthusiastic and interested.
- **Complete and return the Student Assessment Sheet.** Fax, email, or mail the Student Assessment Form a few days prior to your voyage.
- **Create list of student groups.** Divide your students into groups. Three groups for 1-30 students, four groups for 31-45 students, and five groups for 46-60 students.
- **Notify MSI if there are any special needs** (e.g. students in wheelchairs or crutches).
- **Use pre-activities and background information.** This helps prepare your students for the voyage and can be found on the MSI website: www.sfbaymsi.org.
- **Arrange transportation.** Book buses or arrange for carpools. We recommend booking buses as early as possible to ensure they are available for the times that you need them.

Day-of Visit Checklist

- **Arrive 20 minutes prior to the start of your program.** This allows time to use the restrooms and have a snack before your program begins.
- **Dress in layers.** Our location on the water can be windy at times and cold during the winter. Please encourage students to dress warmly.
- **Make sure driver(s) have directions to the Marine Science Institutes.** You will find directions to the Institute on our website at: www.sfbaymsi.org. If you will be traveling via carpool to Redwood City, please make sure parent drivers know to park in MSI's dirt lot only, and not in Stanford's lot.
- **Bring snacks and lunches if you plan on eating on site.** If you would like a snack break during your program, please notify the instructional staff at the start of the program so that they can add it to the schedule. MSI has multiple grassy and sitting areas that are available for groups to use for lunch if they are on site for a program.
- **Bring a trash bag.** MSI does not have the facilities to accommodate the trash generated by participating groups, and has a "no trash" policy. Please bring a plastic garbage bag so you can take any garbage back to your school with you, and encourage your students to bring trash-free lunches.

Post-Visit Checklist

- **Send in Thank You to Sponsors to MSI.** If artwork is involved this also enters the students into MSI's Translating the Tides Competition. See below for more details.
- **Use post-activities.** This helps solidify your students' grasp of knowledge they gained on the voyage and can be found on the MSI website www.sfbaymsi.org.
- **Make sure program balance is paid.**
- **Book for next year.** We take bookings a year in advance, so book early if you want specific times of year or dates.

Program Logistics

Location Considerations

The Marine Science Institute is situated on Redwood Creek in Redwood City. With the use of MSI's Discovery Classroom, Lab facilities, and Marine Science Center, the students observe a variety of organisms from the rocky intertidal habitat for close study and observation. Many of the spaces used for education are outdoors.

Program Length and Student Participation

The Ocean Lab program is 2 and a half hours in length and can accommodate up to 60 students at a time. Depending on the number of students, group size can vary. The students will be split into three to five smaller learning groups in order to rotate through the stations. Three groups for 1-30 students, four groups for 31-45 students, and five groups for 46-60 students. Please have your class divided prior to your arrival. Think about cooperative working groups and learning levels when dividing your class. Please have your students wear name tags for this program.

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Weather and Clothing Considerations

Students will be working both indoors and outdoors around the Marine Science Institute facility. Please have students wear clothing that they do not mind getting a little wet as they interact with animals. Please make sure students dress appropriately for the weather and bring enough layers. They will need warm clothes if it is a cold day, and a rain jacket if it is raining. We conduct programs rain or shine. Hats and sunscreen are recommended for most of the year.

Snack and Lunch

If you would like a snack break either before or during your program, please notify the instructional staff at the start of the program so that they can add it to the schedule. MSI has multiple grassy and sitting areas that are available for groups to use for lunch if they are on site for a program. We do not have the facilities to accommodate the trash generated by participating groups, and have a “no trash” policy. Please bring a plastic garbage bag so you can take any garbage back to your school with you, and encourage your students to bring trash-free lunches.

RESTRICTION: For the animal’s safety, no hand sanitizer or food near the animals.

Sponsor Acknowledgement and Translating the Tides

Translating the Tides is a creative contest run by the Marine Science Institute (MSI) for students in grades kindergarten through college who participate in MSI’s hands-on marine science education programs. Translating the Tides is a wonderful opportunity for students to express, in their own voices and styles, what they have learned and what they want others to know about our aquatic environments. All submissions count as sponsor acknowledgement. Winning entries are selected and may be published on the MSI web site, in our newsletter BayLines, on our monthly desktop calendar and other promotional materials.

Role of Assisting Adults

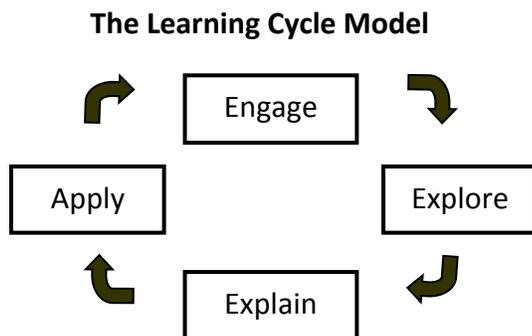
For safety reasons, we require the participation of one adult per group of students. At each station, the students will break up into smaller groups to study individual organisms. It is most helpful if the assisting adults/chaperones wander between these small groups of students to help them observe and identify their organisms. Our method of teaching is to ask thought-provoking questions that will lead students to their own answers. We ask that adults do not provide answers to the students, but help them to discover the answers on their own. Adults will also assist with overall group organization and safety. All adults will be briefed by our instructors at the beginning of the program.

Student Assessment and Learning Cycle

Since 1970, MSI has tailored science activities to meet the needs of teachers’ curriculum. Students and teachers present themselves to our programs with a wide range of interdisciplinary science understandings and skills. Our marine science educators are specially trained to teach all ages with interesting and innovative methods that encourage interaction and problem solving. We encourage you to tailor your program by telling us about a particular theme that your class has been studying. Please fill out the Student Assessment Sheet you received to let us know.

Inspiring respect and stewardship for the marine environment through experiential learning

MSI has modified our working educational philosophy to respond to this broad range and to help teachers and students get the most from our programs. What you do before, during, and after the day of the program will determine to a very large extent how strong a partner MSI will be in helping you meet your learning objectives. As you plan a visit to MSI, please consider how this opportunity fits within your overall instructional objective. What learning outcomes do you desire from this experience? How well is the class positioned to move your desired outcomes toward a reality? Please use the following description of the learning cycle to assess your students.



Engage – Students are just beginning to generate interest in marine science.

“The MSI program will be the hook from which I launch my unit and introduce my class to the excitement of marine science. I’m willing to come into this trip a bit cold...my main objective is to generate curiosity and get the students raising questions.”

Explore – Students are ready to actively experience, form predictions, and make observations.

“My students are already hooked on marine science. I’m bringing them to the MSI program with basic understandings and tools... They know a bit about the Bay and are ready to actively explore it. My objectives are for my students to make observations and to collect and record data. I’d like to see them make informed predictions and to begin framing their own critical questions.”

Explain – Students have been developing understanding for some time, and are now ready to speak the language of marine science.

“By the time we participate in our MSI program my students will have conducted serious investigations of topics related to the San Francisco Bay. My objective is to see them using the language of marine science... I’d like them to begin exploring important concepts and to comprehend and analyze other explanations.”

Apply – Students have a mature understanding of marine science, perhaps including aspects that are far afield from the San Francisco Bay area, and now are ready to relate that knowledge to their own backyard.

“My group has a good handle on the major learning objectives I have set for marine science. MSI’s program is going to provide new scenarios for them to consider and address. My objective is to see my students using and applying their new knowledge in a different context.”

Ocean Lab at MSI Program Description

When you arrive at MSI, you will be greeted by an MSI instructor who will lead your group to the Marine Science Center for an introduction with all students. After the introduction, your group will divide into three to five small groups with an instructor and head to their first station. The students will rotate through five different stations representing the five phyla they are studying. Each group will have about 20 minutes at a station before moving on to the next. During the mollusk station students will participate in a squid dissection to study the external and internal anatomy of a mollusk. Lab sheets will be provided to direct the students, and the instructors and chaperones will be there to provide guidance. The emphasis will be on observation, and your students will be encouraged to touch the animals as part of their observations.

Program Objectives

1. To provide an exciting educational experience that shows students what marine biologists do on a daily basis.
2. To compare and contrast the characteristics of marine invertebrates within four major invertebrate phyla: Cnidaria, Mollusca, Arthropoda and Echinodermata.
3. To relate physical and behavioral adaptations of marine invertebrates to their environment.
4. To identify the ecological zones found along the Pacific Coast, and list the organisms typical to each.
5. To gain an understanding, appreciation, and respect for marine invertebrates and the marine environment.

Arrival Times

Please arrive 20 minutes prior to the start of your program to allow time to use the restrooms and have a snack before your program begins.

Program Format - Station Overview

Introduction:

Once the class is settled in the Marine Science Center, the instructors will introduce topics including tidal zonation, animal adaptations, and scientific classification. They will review the format of the program and explain how to correctly and gently handle the animals. The class will then be divided into three to five learning teams. Within each team, instructors will distribute clipboard, pencil, and the lab sheets. During this introduction, a second instructor will brief the adults on their role with a short chaperone talk.

Learning Stations:

Each learning team will rotate through five hands-on stations representing the Arthropoda, Mollusca, Cnidaria, Echinodermata, and Chordata phyla. At each station, students will explore the characteristics of a particular phylum and answer a series of questions. They will also use identification guides to identify the species they are looking at, as well as information about the animal's diet, range, and interesting adaptations. Once all students are done, they will have an

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opportunity to touch the animals and review the unique adaptations for each. At the mollusk station, students will also participate in a squid dissection to review the external and internal anatomy of a mollusk.

Closing:

Closing activities are chosen according to the group's grade and the theme chosen for the program. Closing activities tie together the different stations students saw that day, and helps define their role in the ecosystem. Students will review the characteristics of the different phyla they saw that day, and an animal example from each. They will also discuss how humans can reduce their impact on the rocky intertidal habitat to help these animals.

Option 2: Ocean Lab Inland Voyage

Pre-Visit Checklist

- **Please review the invoice.** Note the deposit due date; your deposit must be received by that date in order to hold your reservations. A purchase order will be accepted in lieu of a deposit.
- **Make sure you understand the cancellation policy.**
- **Make sure program balance is paid.**
- **Complete and return the Student Assessment Sheet.** Fax, email, or mail the Student Assessment Form a few days prior to your voyage.
- **Complete and return the Inland Voyage Parking and Set-up Form.** Fax, email, or mail the Inland Voyage Parking and Set-up Form a few days prior to your voyage.
- **Notify MSI if there are any special needs** (e.g. students in wheelchairs or crutches).
- **Use pre-activities and background information.** This helps prepare your students for the visit and can be found on the MSI website www.sfbaymsi.org.

Inland Voyage (in school) Day-of Visit Checklist

- **School office is aware of where MSI will be setting up and the room/space is available.**

Post-Visit Checklist

- **Send in Thank You to Sponsors to MSI.** If artwork is involved this also enters the students into MSI's Translating the Tides Competition. See below for more details.
- **Use post-activities.** This helps solidify your students grasp of knowledge they gained on the voyage and can be found on the MSI website www.sfbaymsi.org.
- **Make sure program balance is paid.**
- **Book for next year.** We take bookings a year in advance, so book early if you want specific times of year or dates.

Program Logistics

Location Considerations

The Inland Voyage program is delivered to a school, library, camp, etc. by an MSI truck or van. Since this unit is both transport and life support for the marine organisms, the programs may be presented outside or inside but needs to be accessible and close to the MSI vehicle. The space must be large enough to set up a five-station program for up to 60 students, and must be available for all presentations. This area can be grassy or paved, and shade is required to keep the animals healthy. If shade cannot be provided, please notify MSI staff before the program so that accommodations can be made. If an indoor space is used, it should be accessible without using stairs, have tables, and preferably a non-carpeted floor (the space may get wet). If the area is separated from recess activities or other traffic, the students will be more focused and attentive. Ultimately they will get more out of the experience if these factors are considered.

Program Length and Student Participation

The Ocean Lab program is 2 and a half hours in length and can accommodate up to 60 students at a time. Up to two Ocean Lab presentations may be scheduled in a day, at least 10 minutes is needed between programs to enable staff to set-up for the next program and is essential to the well-being of the animals. Depending on the number of students, group size can vary. The students will be split into three to five smaller learning groups in order to rotate through the stations. Three groups for 1-30 students, four groups for 31-45 students, and five groups for 46-60 students. Please have your class divided prior to our arrival. Think about cooperative working groups and learning levels when dividing your class. Please have your students wear name tags for this program.

Weather and Clothing Considerations

If cold or rainy weather is forecasted, please plan on providing an indoor space for the programs.

Snack and Lunch

If you would like a snack break during your program, please notify the instructional staff at the start of the program so that they can add it to the schedule. When scheduling your Inland Voyage program, please schedule around recesses and lunches.

RESTRICTION: For the animal's safety, no hand sanitizer or food near the animals.

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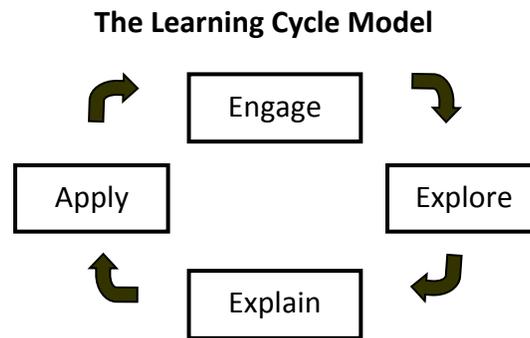
In order to keep program costs at a minimum, we require the participation of at least one classroom teacher or adult. Each group of students will be working with one instructor and any available adults. At each station, the groups will break into smaller groups to study individual organisms. Our method of teaching is to ask thought-provoking questions that will lead students to their own answers. We ask that adults do not provide answers to the students, but let them discover the answers on their own.

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Ocean Lab Inland Voyage Program Description

The Ocean Lab Inland Voyage begins with a thorough introduction of the rocky shore habitat and explanation of scientific classification. After the introduction, your group will divide into three to five small groups with an instructor and head to their first station. The students will rotate through five different stations representing the five phyla they are studying. Each group will have about 20 minutes at a station before moving on to the next. Lab sheets will be provided to direct the students, and the instructors and chaperones will be there to provide guidance. The emphasis will be on observation, and your students will be encouraged to touch the animals as part of their observations.

Program Objectives

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Program Format - Station Overview

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Learning Stations:

Each learning team will rotate through five hands-on stations representing the Arthropoda, Mollusca, Cnidaria, Echinodermata, and Chordata phyla. At each station, students will explore the characteristics of a particular phylum and answer a series of questions. They will also use identification guides to identify the species they are looking at, as well as information about the animal's diet, range, and interesting adaptations. Once all students are done, they will have an opportunity to touch the animals and review the unique adaptations for each.

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Closing:

Closing activities are chosen according to the group's grade and the theme chosen for the program. Closing activities tie together the different stations students saw that day, and helps define their role in the ecosystem. Students will review the characteristics of the different phyla they saw that day, and an animal example from each. They will also discuss how humans can reduce their impact on the rocky intertidal habitat to help these animals.