Many people associate careers in oceanography as consisting of swimming with marine animals at a marine life park or snorkeling in crystal-clear tropical waters studying coral reefs. In reality, these kinds of jobs are extremely rare and there is intense competition for the few jobs that do exist. Most oceanographers work in fields that use science to solve a particular problem in the ocean. Some examples include:

- What is the role of the ocean in limiting the greenhouse effect?
- What kinds of pharmaceuticals can be found naturally in marine organisms?
- How does sea-floor spreading relate to the movement of tectonic plates?
- What economic deposits are there on the sea floor?
- Can rogue waves be predicted?
- What is the role of longshore transport in the distribution of sand on the beach?
- How does a particular pollutant affect organisms in the marine environment?

Preparation for a Career in Oceanography

Preparing yourself for a career in oceanography is probably one of the most interesting and rewarding (yet difficult) paths to travel. The study of oceanography is typically divided into different academic disciplines (or sub-fields) of study. The four main disciplines of oceanography are:

- **Geological oceanography** is the study of the structure of the sea floor and how the sea floor has changed through time; the creation of sea floor features; and the history of sediments deposited on it.
- **Chemical oceanography** is the study of the chemical composition and properties of seawater; how to extract certain chemicals from seawater; and the effects of pollutants.
- **Physical oceanography** is the study of waves, tides, and currents; the ocean-atmosphere relationship that influences weather and climate; and the transmission of light and sound in the oceans.
- **Biological oceanography** is the study of the various oceanic life forms and their relationships to one another; adaptations to the marine environment, and developing ecologically sound methods of harvesting seafood.

Other disciplines include ocean engineering, marine archaeology, and marine policy. Since the study of oceanography often examines in detail all the different disciplines of oceanography, it is often described as being an interdisciplinary science, or one covering all the disciplines of science as they apply to the oceans. Thus, some of the most exciting work and best employment opportunities combine two or more of these disciplines.

Individuals in oceanography and marine-related fields need a good background in at least one area of basic science (for example, geology, physics, chemistry, or biology) or engineering. In almost all cases, mathematics is required as well. Marine archaeology requires a background
in archaeology or anthropology; marine policy studies require a background in at least one of the social sciences (such as law, economics, or political science).

The ability to speak and write clearly—as well as critical thinking skills—are prerequisites for any career. Fluency in computers—preferably PC systems, not Macintosh—is rapidly becoming a necessity. Because many job opportunities in oceanography require trips on research vessels, any shipboard experience is also desirable. Mechanical ability (the ability to fix equipment while on board a vessel without having to return to port) is a plus. Depending on the type of work that is required, other traits that may be desirable include: the ability to speak one or more foreign languages; certification as a scuba diver; the ability to work for long periods of time in cramped conditions; physical stamina; physical strength; and, of course, a high tolerance to motion sickness.

Since oceanography is such a new science (with much room left for new discoveries) most people enter the field with an advanced degree (master’s or doctorate). One exception to this is to work as a marine technician, which usually requires a bachelor’s degree or applicable experience. It does take a large commitment to achieve an advanced degree, but, in the end, the journey itself is what makes all the hard work worthwhile.

**Job Duties of Oceanographers**

Many job opportunities for oceanographers exist with scientific research institutions (universities) and various government agencies. Private companies who are engaged in searching for economic sea floor deposits, investigating areas for sea farming, and evaluating natural energy production from waves, currents, and tides also hire oceanographers. The job duties of oceanographers vary from place to place, but can be generally described as follows:

*Geological oceanographers and geophysicists* explore the ocean floor and map submarine geologic structures. Studies of the physical and chemical properties of rocks and sediments give us valuable information about Earth’s history. The results of their work help us understand the processes that created the ocean basins and the interactions between the ocean and the sea floor.

*Physical oceanographers* investigate such ocean properties as temperature, density, wave motions, tides, and currents. They study the ocean-atmosphere relationship that influences weather and climate, the transmission of light and sound through water, and the ocean’s interactions with its boundaries at the sea floor and the coast.

*Chemical oceanographers and marine geochemists* investigate the chemical composition of seawater and its interaction with the atmosphere and the sea floor. Their work may include analysis of seawater components, desalination of seawater, and studying the effects of pollutants. They also examine chemical processes operating within the marine environment and work with biological oceanographers on studies of living systems. Their study of trace chemicals in seawater helps us understand how ocean currents move...
seawater around the globe, and how the ocean affects climate.

**Biological oceanographers, marine biologists, and fisheries scientists** study marine plants and animals. They are interested in how marine organisms develop, relate to one another, adapt to their environment, and interact with it. Their work includes developing ecologically sound methods of harvesting seafood and studying biological responses to pollution. New fields associated with biological oceanography include marine biotechnology (the use of natural marine resources in the development of new industrial and biomedical products) and molecular biology (the study of the structure and function of bioinformational molecules—such as DNA, RNA, and proteins—and the regulation of cellular processes at the molecular level). Because marine biology is the most well-known oceanographic field (and because the larger marine animals have such wide appeal), it is currently the most competitive sector of oceanography.

**Marine and ocean engineers** apply scientific and technical knowledge to practical uses. Their work ranges from designing sensitive instruments for measuring ocean processes to building marine structures that can withstand ocean currents, waves, tides, and severe storms. Subfields include acoustics, robotics, electrical, mechanical, civil, and chemical engineering and naval architecture. They often use highly specialized computer techniques.

**Marine archaeologists** are involved in the systematic recovery and study of material evidence, such as shipwrecks, graves, buildings, tools, and pottery remaining from past human life and culture that is now covered by the sea. Marine archaeologists use state-of-the-art technology to locate various underwater sites.

**Marine policy experts** combine their knowledge of oceanography and social sciences, law, or business to develop guidelines and policies for the wise use of the ocean and coastal resources. Marine policy requires a knowledge of at least one of these other disciplines as well as a sound understanding of oceanographic issues.

**Sources of Information**

- Consult the catalog of any college or university that offers a curriculum in oceanography or marine science.
- The Oceanography Society publishes an excellent brochure entitled *Careers in Oceanography and Marine-Related Fields*. The Oceanography Society can be contacted at 4052 Timber Ridge Drive, Virginia Beach, VA 23455 and their telephone number is (804) 464-0131.
• The National Sea Grant College Program of NOAA publishes a comprehensive brochure entitled *Marine Science Careers: A Sea Grant Guide to Ocean Opportunities*, which includes interviews with working oceanographers. The Sea Grant College can be reached c/o NOAA, SSMC3 Room 11606, 1315 East-West Highway, Silver Spring, MD 20910 and their telephone number is (301) 713-2431.

• The Scripps Institution of Oceanography at the University of California, San Diego publishes an informative brochure aimed at perspective students entitled *Preparing for a Career in Oceanography*. General information about Scripps can be obtained by contacting the Scripps Communication Office at the Scripps Institution of Oceanography, University of California San Diego, 9500 Gilman Drive Department 0233, La Jolla, CA 92093-0233 and their telephone number is (619) 534-3624.

### Some Web sites that contain oceanography career information on-line:

- The International Oceanographic Foundation at: [http://www.rsmas.miami.edu/iof/](http://www.rsmas.miami.edu/iof/)
- The Office of Naval Research’s web site, which includes The Oceanography Society’s brochure entitled *Careers in Oceanography and Marine-Related Fields* at: [http://www.onr.navy.mil/onr/careers/default.htm](http://www.onr.navy.mil/onr/careers/default.htm)
- A comprehensive list of information about careers in oceanography, marine science, and marine biology is available through the Scripps Institution of Oceanography Science Library’s web site at: [http://scilib.ucsd.edu/sio/guide/career.html](http://scilib.ucsd.edu/sio/guide/career.html), including a popular “So You Want to Become a Marine Biologist” web site at: [http://www-siograddept.ucsd.edu/Web/To_Be_A_Marine_Biologist.html](http://www-siograddept.ucsd.edu/Web/To_Be_A_Marine_Biologist.html)
- A listing of marine laboratories and institutions is available at: [http://life.bio.sunysb.edu/marinebio/mlabs.html](http://life.bio.sunysb.edu/marinebio/mlabs.html)
- The Woods Hole Oceanographic Institution has developed a web site devoted to the advancements of women in oceanography. It features biographies and unique perspectives of women scientists, and is at: [http://www.womenoceanographers.org](http://www.womenoceanographers.org).

(Source: [http://www.palomar.edu/oceanography/links/Careers.html](http://www.palomar.edu/oceanography/links/Careers.html))