

OCEANOGRAPHY (M.S.)

<https://ceps.unh.edu/earth-sciences/program/ms/oceanography>

Description

The Oceanography (OCE) graduate program has a diverse set of faculty, staff, and students who examine ocean processes in broad fields of physical, biological, chemical, and geological oceanography and geophysics. Basic and applied research of an experimental, numerical, and analytical nature is conducted in oceanic settings that range from shallow nearshore and estuarine waters to the deep ocean and span all ocean basins on earth including the Arctic.

OCE offers programs leading to M.S. and Ph.D. degrees. These interdisciplinary programs prepare students for professional careers in ocean-related fields. In addition, students can also pursue an ocean mapping option within the Department of Earth Sciences and carried out within the Center for Coastal and Ocean Mapping.

Research and Facilities

The oceanography graduate program within the Department of Earth Sciences and the School of Marine Science and Ocean Engineering (SMSOE) is enhanced by the ocean engineering and marine biology graduate programs, and by other departments and institutes at UNH, including the civil and mechanical engineering and biology departments; the Institute for the Study of Earth, Oceans, and Space (EOS); the Center for Coastal and Ocean Mapping (CCOM); and the Ocean Processes Laboratory (OPAL). Other related programs include the N.H. Sea Grant Program, the Center for Collaborative Science, and the Atlantic Marine Aquaculture Center, Coastal Response Research Center (CRRC), Northeast Consortium (NEC), and the Piscataqua Region Estuaries Partnership (PREP). Oceanographic laboratories at UNH include the Shoals Marine Laboratory (SML) on Appledore Island, the Coastal Marine Laboratory (CML) in Newcastle, the Jackson Estuarine Laboratory (JEL) at Adams Point on the Great Bay, and the Chase Ocean Engineering Laboratory (COEL) on the main UNH campus. Additional laboratories for the oceanography faculty are located on campus in James, Morse, Rudman, and Spaulding Halls. The SMSOE operates a marine support facility and two UNH research vessels moored in Portsmouth Harbor at the UNH pier, the R/V Gulf Challenger and the R/V Gulf Surveyor, as well as a number of small boats. The SMSOE also supports the UNH Diving Program and oversees a shared use Instrumentation Pool for student and faculty use.

Admission Requirements

Applicants should have completed an undergraduate major related to one of the oceanography disciplines, including biology, chemistry, engineering, geology, physics, or mathematics, or an appropriate array of science and engineering courses within their major field. Applicants are expected to have completed one year each of calculus and chemistry and two semesters of physics and/or biology. It is not necessary to have had previous coursework in oceanography.

Requirements

Degree Requirements

Students must complete a minimum of **30 credits for the thesis option** or **34 credits for the non-thesis option**.

Code	Title	Credits
Required Courses		
ESCI 997	Seminar in Earth Sciences	1
ESCI 998	Proposal Development	1
Select two courses from the following:		6-8
BIOL 855	Biological Oceanography	
ESCI 852	Chemical Oceanography	
ESCI 858	Introduction to Physical Oceanography	
ESCI 859	Geological Oceanography	
<i>Thesis/Non-Thesis Option</i>		
Select one of the following options:		6 or 2
Thesis Option:		
OCE 899	Master's Thesis (acceptable to the thesis-examining committee and must pass a thesis defense)	
Non-Thesis Option:		
ESCI 898 or OCE 898	Directed Research Directed Research	
<i>Other Relevant Graduate Courses</i>		
Select from the following courses:		16-22
BIOL 828	Marine Bioacoustics	
BIOL 873	Physiology of Fishes	
CEE 822	Introduction to Marine Pollution and Control	
ESCI 801	Quantitative Methods in Earth Sciences	
ESCI 820	Ocean Measurements Lab	
ESCI 834	Global Geophysics	
ESCI 841	Geochemistry	
ESCI 845	Isotope Geochemistry	
ESCI 847	Aqueous Geochemistry	
ESCI 849	Ocean Biogeochemistry	
ESCI 854	Sedimentology	
ESCI 856	Geotectonics	
ESCI 860	Paleoceanography	
ESCI 862	Glacial Geology	
ESCI 864	Spectral Analysis of Geophysical Time Series Data	
ESCI 865	Paleoclimatology	
ESCI 871	Positioning for Ocean Mapping	
ESCI 874	Integrated Seabed Mapping Systems	
ESCI 875	Advanced Topics in Ocean Mapping	
ESCI 896	Topics (Nearshore Processes)	
ESCI 972	Hydrographic Field Course	
ESCI 995	Advanced Topics (Geophysical Fluid Dynamics)	
ESCI 996	Advanced Topics (Ocean Modeling)	
ESCI 996	Advanced Topics (Nearshore Hydrodynamics)	
IAM 940	Asymptotic and Perturbation Methods	
MATH 835	Statistical Methods for Research	
MATH 839	Applied Regression Analysis	
MATH 845	Foundations of Applied Mathematics I	
MATH 853	Introduction to Numerical Methods	
ME 807	Analytical Fluid Dynamics	
ME 812	Waves in Fluids	
NR 844	Biogeochemistry (or ESCI 896 Topics (Biogeochemistry))	
OE 853	Ocean Hydrodynamics	
OE 854	Ocean Waves and Tides	
OE 857	Coastal Engineering and Processes	
OE 865	Underwater Acoustics	
OE 995	Graduate Special Topics (Coastal Sediment Transport)	
ZOOL 810	Sharks and Bony Fishes	
Total Credits		30-34

Accelerated Master's

This graduate program is approved to be taken on an accelerated basis in articulation with certain undergraduate degree programs.

General Accelerated Master's policy, note that some programs have additional requirements (e.g. higher grade expectations) compared to the policy.

Please see the [Graduate School website](#) and contact the department directly for more information.

Student Learning Outcomes

Program Learning Outcomes

Core Knowledge

- Demonstrate a foundation of knowledge in at least 2 of the main branches of oceanography: Geological, Biological, Physical, or Chemical.
- Geological Oceanography: An understanding marine geology and geophysics, including major geological features and history of the world's oceans, processes of the ocean floor, composition and structure of the Earth, plate tectonic theory, marine sedimentology, and paleoceanography.
- Biological Oceanography: An understanding of marine ecosystems, primary and secondary productivity, trophodynamics, plankton diversity, zooplankton ecology, global ocean dynamics, and the physical and chemical processes that govern nutrient and light availability, the concept of food webs, role of microbes, and fisheries and anthropogenic interactions with fish stocks.
- Physical Oceanography: An understanding of the physics of the ocean, including general wind-driven and thermohaline circulation, geostrophic flow, upwelling, waves and tides, continental and nearshore processes. the effect of the earth's rotation on large scale global ocean circulation, and instrumentation and methods used in obtaining observations.
- Chemical Oceanography: An understanding of the physical and biogeochemical process that determine the composition of seawater, including biological effects on chemistry, ocean nutrient cycles, air-sea gas exchange, radiogenic and stable isotopes as tracers of ocean properties, sediment and trace metal chemistry.
- Demonstrate basic knowledge of how the processes within the main branches of oceanography interact with each other.
- Demonstrate specialized knowledge of a field within oceanography sufficient to conduct substantive supervised research.

Research Methods and Analysis

- Identify and demonstrate knowledge of a range of qualitative and quantitative methodologies typically used in geochemistry research.
- Discover and critically read published research in the Earth sciences and related fields of mathematics, statistics, physics, chemistry, and biology.
- Frame empirical research and/or theory guided by prior knowledge.
- Implement a rigorous study using appropriate methods, measures and techniques.

- Critically evaluate and systematically analyze data to reach appropriate findings and interpretations.

Scholarly Communication

- Structure a coherent argument that rigorously presents and evaluates evidence to support claims.
- Review and cogently synthesize relevant literature.
- Write at a level and in a style of English consistent with that found in leading academic journals.
- Understand and properly use styles of citing, referencing, and formatting found in leading academic journals.
- Clearly convey research findings through oral presentation supported by appropriate digital media.
- Cogently summarize research and its significance to non-specialist audiences.

Professionalism and Pedagogy

- Prepare manuscripts that meet the standards of academic and research journals and respond appropriately to recommendations for revision.
- Demonstrate collaboration, leadership and teamwork.
- Create a welcoming environment that is supportive, inclusive and equitable.
- Make effective contributions to university, community and professional service.
- Communicate effectively to groups in a lecture format.