# EARTH SCIENCES: OCEAN MAPPING (M.S.)

https://ceps.unh.edu/earth-sciences/program/ms/earth-sciences-ocean-mapping

## Description

A degree option in Ocean Mapping is for students with interests in hydrography and hydrographic survey technology who wish to prepare for careers in such areas as federal and institutional marine research, federal and international positions in hydrographic surveying, the environment, private sector offshore mineral resources exploration industries, and marine hardware and software development. The study of ocean mapping is a key niche in the ocean technology field.

Hydrography, in the context of this program, is the measurement and definition of the configuration of the bottoms and adjacent land areas of oceans, lakes, rivers, harbors, and other water areas, and the tides (or water levels) and currents that occur in those bodies of water. It includes elements of both physical oceanography, and surveying and mapping.

Ocean mapping is a broader concept that includes not only the elements of hydrography, but also encompasses such topics as the geologic characterization of the seabed and the mapping of living resources and habitats.

## Admission Requirements

An applicant to the M.S. program is expected to have demonstrated competency in the following college courses: one year of calculus, one semester of chemistry, and at least three additional semesters of chemistry, physics, and/or biology. In addition, the applicant is expected to have an undergraduate degree or equivalent in geology, chemistry, physics, mathematics, computer science, engineering, or the biological sciences. Students lacking some background in a particular area may be admitted provided they are prepared to complete courses, without graduate credit, in which they may be deficient. The program of study a student wishes to follow and the student's undergraduate major determine the level of preparation necessary. The preparation of each student is determined before the beginning of the first semester in residence in order to plan the course of study. Each entering student is assigned an academic adviser to assist in planning a program of study.

More information is available from the Center for Coastal and Ocean Mapping (CCOM), which oversees this degree program.

## Requirements

## Degree Requirements
## Thesis Option

Students in the thesis option must satisfactorily complete at least **30 graduate credits**, which include the credits accumulated in the core curriculum. Students in this option must complete a master's thesis (6 credits) and give an oral presentation of the results.

## Non-Thesis Option

Students in the non-thesis option must satisfactorily complete at least **34 graduate credits**, which includes the core curriculum, a 2--credit directed research project (ESCI 898 Directed Research), and a written and oral presentation of that research.

## Ocean Mapping

The core curriculum for the option in ocean mapping normally includes:

| Code | Title | Credits |
|---|---|---|
| **Required Courses** | | |
| ESCI 997 | Seminar in Earth Sciences (first year) | 1 |
| ESCI 998 | Proposal Development (first year) | 1 |
| **Additional Courses** | | |
| ESCI 858 | Introduction to Physical Oceanography | 3 or 2 |
| or ESCI 868 | Applied Physical Oceanography for Hydrographic Surveyors | |
| ESCI 859 | Geological Oceanography | 4 or 2 |
| or ESCI 869 | Marine Geology and Geophysics for Hydrographic Surveyors | |
| ESCI 870 | Geodesy for Ocean Mapping | 3 |
| ESCI 871 | Positioning for Ocean Mapping | 4 |
| ESCI 872 | Applied Tools for Ocean Mapping | 2 |
| ESCI 874 | Integrated Seabed Mapping Systems | 4 |
| ESCI 875 | Advanced Topics in Ocean Mapping | 4 |
| ESCI 972 | Hydrographic Field Course | 4 |
| **Master's Thesis or Directed Research** | | |
| Select from the following: | | |
| ESCI 899 | Master's Thesis | 6 |
| ESCI 898 | Directed Research | 2 |

Students may fulfill the Category A (professional) International Federation of Surveyors/International Hydrographic Organization/ International Cartographic Association (FIG/IHO) Standards of Competence for Hydrographic Surveyors by completing some additional specialized requirements.

## Degree Plan

## Sample Degree Plan

*This sample degree plan serves as a general guide; students collaborate with their academic advisor to develop a personalized degree plan to meet their academic goals and program requirements.*

| **First Year** | | |
|---|---|---|
| **Fall** | | **Credits** |
| ESCI 870 | Geodesy for Ocean Mapping | 3 |
| ESCI 872 | Applied Tools for Ocean Mapping | 2 |
| ESCI 874 | Integrated Seabed Mapping Systems | 4 |
| ESCI 997 | Seminar in Earth Sciences | 1 |
| | **Credits** | **10** |
| **Spring** | | |
| ESCI 871 | Positioning for Ocean Mapping | 4 |
| ESCI 875 | Advanced Topics in Ocean Mapping | 4 |
| ESCI 998 | Proposal Development | 1 |
| | **Credits** | **9** |
| **Summer** | | |
| ESCI 972 | Hydrographic Field Course | 4 |
| | **Credits** | **4** |

| | | |
|---|---|---|
| **Second Year** | | |
| **Fall** | | |
| ESCI 858 | Introduction to Physical Oceanography | 3 |
| ESCI 859 | Geological Oceanography | 4 |
| ESCI 899 | Master's Thesis ( or Elective for non-thesis option) | 3-4 |
| | **Credits** | **10-11** |
| **Spring** | | |
| Elective | | 3-4 |
| ESCI 899<br>or ESCI 898 | Master's Thesis<br>or Directed Research | 2 or3 |
| | **Credits** | **5-7** |
| | **Total Credits** | **38-41** |

## Student Learning Outcomes

# Program Learning Outcomes

Students graduating with a MS in Earth Sciences: Ocean Mapping should achieve the following learning outcomes:

# Core Knowledge

- Demonstrate foundational knowledge in ocean mapping technology and physical oceanographic and tidal processes that result in expertise focused on applications of hydrography to determine the configuration of subsea and adjacent land topography and geomorphology of oceans, lakes, rivers, harbors, and other water bodies.
- Demonstrate basic knowledge of how hydrography and ocean mapping interact with other related disciplines.
- Demonstrate specialized knowledge of ocean mapping 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 ocean mapping 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.