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

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

**Description**

A degree option in Ocean Mapping is for students 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.

More information about CCOM (Center for Coastal and Ocean Mapping), which oversees this degree program, can be found at [http://ccom.unh.edu](http://ccom.unh.edu).

**Requirements**

**Admission Requirements**

An applicant to the M.S. program is expected to have completed one year of calculus and at least four semesters of college chemistry, physics, and/or biology; and to have an undergraduate degree or equivalent in geology, chemistry, physics, mathematics, 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.

**Degree Requirements**

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.

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:

**Degree Plan**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ESCI 858</td>
<td>Introduction to Physical Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>or ESCI 868</td>
<td>Applied Physical Oceanography for Hydrographic Surveyors</td>
<td></td>
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<tr>
<td>ESCI 889</td>
<td>Geological Oceanography</td>
<td>4</td>
</tr>
<tr>
<td>or ESCI 869</td>
<td>Marine Geology and Geophysics for Hydrographic Surveyors</td>
<td></td>
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<tr>
<td>ESCI 871</td>
<td>Geodesy and Positioning for Ocean Mapping</td>
<td>3-4</td>
</tr>
<tr>
<td>ESCI 872</td>
<td>Applied Tools for Ocean Mapping</td>
<td></td>
</tr>
<tr>
<td>ESCI 874</td>
<td>Integrated Seabed Mapping Systems</td>
<td>3-4</td>
</tr>
<tr>
<td>ESCI 875</td>
<td>Advanced Topics in Ocean Mapping</td>
<td></td>
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<tr>
<td>ESCI 972</td>
<td>Hydrographic Field Course</td>
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<tr>
<td>MATH 831</td>
<td>Mathematics for Geodesy</td>
<td></td>
</tr>
</tbody>
</table>

**Required Courses:**

- ESCI 997 | Seminar in Earth Sciences (first year) | |
- ESCI 998 | Proposal Development (first year) | |

**Select Master’s Thesis or Directed Research:**

- ESCI 899 | Master’s Thesis | |
- ESCI 898 | Directed Research | |

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. For more information, please visit the Center for Coastal and Ocean Mapping website, [www.ccom.unh.edu](http://www.ccom.unh.edu).
Student Learning Outcomes

Students graduating with a MS in Earth Sciences (Geology, Geochemical Systems, or Ocean Mapping focus) should be able to:

Core Knowledge

• Demonstrate a foundation of knowledge in Geology, Geochemical Systems, or Ocean Mapping that results in expertise in at least one of the following:
  • Solid Earth Processes: An understanding of geology, geophysics, or petrology at a range of timescales, focused on, for example, the structure of the Earth, plate tectonic reconstructions, seismology and earthquake hazards, magmatic, volcanic, or metamorphic processes, or other studies that allow for the reconstruction of geologic, geophysical, or petrologic processes at a range of spatial and time scales.
  • Earth Surface Processes: An understanding of surficial processes and their manifestations in the geologic record at a range of timescales, focused on, for example, sedimentary and glacial geology, paleontology, geomorphology and landscape evolution, limnology, and paleoclimatology.
  • Geochemical Processes and Elemental Cycles on Earth: An understanding of the chemistry and chemical interactions in the Earth's mantle, crust, or on the surface of the Earth in terrestrial or aquatic environments or in the atmosphere focused on, for example, biogeochemical processes that govern the distribution and cycling of elements and nutrients, processes that add and remove elements in various environments, or the chemical transformations and exchanges between the atmosphere, oceans, and solid Earth at a range of timescales.
  • Ocean Mapping Technology and Applications: An understanding of the physics sound in the ocean, focused on, for example, applications in hydrography to determine 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, and ocean mapping to determine subsea geomorphology.