**Marine Science, B.S.**

The Bachelor of Science in marine science provides students with a comprehensive understanding of the oceans and how the chemical and physical dynamics interact with the geology and biology of marine environments. The degree provides for upper-level specialization depending on the student’s interests and emphasizes real-world applications incorporating a diverse skill set such as statistics, communications and policy. A required field and laboratory experience course provides students with the unique opportunity to conduct research at the Baruch Marine Field Lab in Georgetown, SC.

The diverse approach to marine science provides the background and skills for students to enter a variety of related career opportunities. Graduates can continue to pursue marine science through graduate or professional school or find careers in government, industry and non-profit entities.

**Learning Outcomes**

1. Students will demonstrate that they understand the scientific process by testing hypotheses related to Marine Science in an inquiry based, hands on setting.
2. Students will demonstrate critical thinking skills using the scientific method.
3. Students will demonstrate the ability to conduct independent research.
4. Students will demonstrate effective oral communication of Marine Science topics by giving an oral presentation.
5. Students will communicate and summarize their research findings effectively in writing (such as on a poster or in an abstract) on Marine Science topics.

**Progression Requirement**

Marine Science majors may enroll in the following courses a maximum of twice to earn the required grade of C or higher: MATH through MATH 142, CHEM 111, CHEM 111L, CHEM 112, CHEM 112L, PHYS 201/PHYS 201L or PHYS 211/PHYS 211L, PHYS 202/PHYS 202L or PHYS 212/PHYS 212L. For the purposes of this standard of progression, withdrawal with a W does not constitute enrollment. These courses must be completed before the beginning of the student's third academic year (fifth major semester) as a marine science major.

**Transfer Requirement**

Any student applying for transfer to the marine science major from other programs within the University, or from other accredited colleges and universities, is required to have a minimum overall grade point average of 2.50 on a 4.00 scale.

**Admissions**

**Entrance Requirements**

New freshmen who meet University admissions standards are eligible for admission to degree programs offered by the college. A student who wishes to enter the College of Arts and Sciences from another college on the Columbia campus must be in good standing and have a cumulative GPA of 2.00 or higher. A student who wishes to enter the College of Arts and Sciences from another USC campus must fulfill one of the following requirements:

1. Be in good standing, meet the admission requirements for a baccalaureate degree on the Columbia campus, and have a cumulative GPA of 2.00 or higher.
2. Be in good standing and have completed 30 semester hours with a GPA of 2.00 or higher on a USC campus.

**Degree Requirements (128 hours)**

**Program of Study**

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Carolina Core</td>
<td>34-46</td>
</tr>
<tr>
<td>2. College Requirements</td>
<td>15-18</td>
</tr>
<tr>
<td>3. Program Requirements</td>
<td>28-43</td>
</tr>
<tr>
<td>4. Major Requirements</td>
<td>36</td>
</tr>
</tbody>
</table>

**Founding Documents Requirement**

All undergraduate students must take a 3-credit course or its equivalent with a passing grade in the subject areas of History, Political Science, or African American Studies that covers the founding documents including the United State Constitution, the Declaration of Independence, the Emancipation Proclamation and one or more documents that are foundational to the African American Freedom struggle, and a minimum of five essays from the Federalist papers. This course may count as a requirement in any part of the program of study including the Carolina Core, the major, minor or cognate, or as a general elective. Courses that meet this requirement are listed here (https://academicbulletins.sc.edu/undergraduate/founding-document-courses/).

1. **Carolina Core Requirements (34-46 hours)**

   **CMW – Effective, Engaged, and Persuasive Communication: Written (6 hours)**
   
   must be passed with a grade of C or higher
   
   • any CC-CMW courses (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

   **ARP – Analytical Reasoning and Problem Solving (8 hours)**
   
   • MATH 141* Must be passed with a C or higher
   
   • MATH 142* Must be passed with a D or higher

   **SCI – Scientific Literacy (8 hours)**
   
   must be passed with a grade of C or higher
   
   • MSCI 101*
   
   • MSCI 102*
GFL – Global Citizenship and Multicultural Understanding: Foreign Language (0-6 hours)
Demonstration of proficiency in one foreign language equivalent to the minimal passing grade on the exit examination in the 122 course is required. Students can demonstrate this proficiency by successfully completing Phase II of the Proficiency Test or by successfully completing the 122 course, including the exit exam administered as part of that course.

- CC-GFL courses (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

It is strongly recommended that students continuing the study of a foreign language begin college-level study of that language in their first semester and continue in that language until their particular foreign language requirement is completed.

GHS – Global Citizenship and Multicultural Understanding: Historical Thinking (3 hours)
- any CC-GHS course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

GSS – Global Citizenship and Multicultural Understanding: Social Sciences (3 hours)
- any CC-GSS course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

AIU – Aesthetic and Interpretive Understanding (3 hours)
- any CC-AIU course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

CMS – Effective, Engaged, and Persuasive Communication: Spoken Component (0-3 hours)
- any overlay or stand-alone CC-CMS (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/course)

INF – Information Literacy (0-3 hours)
- any overlay or stand-alone CC-INF course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

VSR – Values, Ethics, and Social Responsibility (0-3 hours)
- any overlay or stand-alone CC-VSR course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

1 Carolina Core Stand Alone or Overlay Eligible Requirements – Overlay-approved courses offer students the option of meeting two Carolina Core components in a single course. A maximum of two overlays is allowed. The total Carolina Core credit hours must add up to a minimum of 31 hours. Some programs may have a higher number of minimum Carolina Core hours due to specified requirements.

2. College Requirements (15-18 hours)
Foreign Language (0-3 hours)
- only if needed to meet 122-level proficiency

Analytical Reasoning (6 hours)
Course Title Credits
STAT 515 Statistical Methods I (*) 3

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 102</td>
<td>General Applications Programming (*)</td>
<td>3</td>
</tr>
<tr>
<td>or a higher level CSCE course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSCI 305</td>
<td>Ocean Data Analysis</td>
<td></td>
</tr>
<tr>
<td>MSCI 509</td>
<td>MATLAB-Based Data Analysis in Ocean Sciences</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours 6

Note: Courses used to fulfill the College requirements may not also be used to fulfill other degree requirements.

History (3 hours)
The College of Arts and Sciences requires one additional GHS course beyond the Carolina Core GHS requirement.

- If the Carolina Core GHS requirement is fulfilled by a U.S. history course, the College of Arts and Sciences history requirement must be fulfilled by a non-U.S. history course.
- If the Carolina Core GHS requirement is fulfilled by a non-U.S. history course, the College of Arts and Sciences history requirement must be fulfilled by a U.S. history course.

Please select the College of Arts and Sciences history requirement from the approved list of U.S. and non-U.S. history courses (https://academicbulletins.sc.edu/undergraduate/arts-sciences/history-requirement/).

Social Science and Fine Arts or Humanities (6 hours)

- Social Science (3 hours)
  - The College of Arts and Science requires one 3-hour Social Science Course (https://academicbulletins.sc.edu/undergraduate/arts-sciences/courses-acceptable-social-science/)

- Fine Arts/Humanities (3 Hours)
  - A Bachelor of Science from the College of Arts and Sciences requires one 3-hour Fine Arts/Humanities Course (https://academicbulletins.sc.edu/undergraduate/arts-sciences/courses-acceptable-fine-arts-humanities/)

3. Program Requirements (28-43 hours)
Supporting Courses (16 hours)
Course Title Credits
Select one of the following: 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 201 &amp; 201L</td>
<td>General Physics I and General Physics Laboratory I (*)</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 211 &amp; 211L</td>
<td>Essentials of Physics I and Essentials of Physics I Lab (*)</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following: 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 202 &amp; 202L</td>
<td>General Physics II and General Physics Laboratory II (*)</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 212 &amp; 212L</td>
<td>Essentials of Physics II and Essentials of Physics II Lab (*)</td>
<td></td>
</tr>
</tbody>
</table>
Major Courses (13 hours)

- CHEM 111 General Chemistry I and General Chemistry I Lab (*) 4
- CHEM 112 General Chemistry II and General Chemistry II Lab (*) 4

Total Credit Hours 16

1 Students in the Physical Oceanography concentration must take PHYS 211 & PHYS 211L.
2 Students in the Physical Oceanography concentration must take PHYS 212 & PHYS 212L.

Cognate or Minor (0-18 hours)

This major does not require a cognate or minor.

An optional minor may be added to a student’s program of study. A minor is intended to develop a coherent basic preparation in a second area of study. Courses applied toward general education requirements cannot be counted toward the minor. No course may satisfy both major and minor requirements. All minor courses must be passed with a grade of C or higher. At least half of the courses in the minor must be completed in residence at the University. A list of minor programs of study can be found at Programs A-Z. An optional additional major may also be added to a student’s program of study. Additional majors must include all major courses as well as any prescribed courses noted (*) in the bulletin. Prescribed courses noted in the bulletin may be shared with Carolina Core, College requirements, and Program requirements in the primary program.

A list of minor programs of study can be found at Programs A-Z (https://academicbulletins.sc.edu/undergraduate/programs-az/).

Electives (12-27 hours)

120 (or 128) degree applicable credits are required to complete any degree at USC. After the cognate, minor or second major is complete, any additional credits needed to reach 120 (or 128) total credits can be fulfilled by electives. No courses of a remedial, developmental, skill-acquiring, or vocational nature may apply as credit toward degrees in the College of Arts and Sciences. The College of Arts and Sciences allows the use of the Pass-Fail option on elective courses. Further clarification on inapplicable courses can be obtained from the College of Arts and Sciences.

4. Major Requirements (36 hours)

A minimum grade of C is required in all major courses

Major Courses (13 hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSCI 311</td>
<td>Biology of Marine Organisms</td>
<td>4</td>
</tr>
<tr>
<td>MSCI 313</td>
<td>The Chemistry of the Sea</td>
<td>4</td>
</tr>
<tr>
<td>MSCI 314</td>
<td>Physical Oceanography</td>
<td>4</td>
</tr>
<tr>
<td>MSCI 505</td>
<td>Senior Seminar</td>
<td>1</td>
</tr>
</tbody>
</table>

Required Field Experience 1

Total Credit Hours 13

1 All MSCI majors are required to complete a minimum of 60 hours of marine science field effort. Possibilities include taking the MSCI 460 class, semester or summer internship, REU, semester at sea, faculty-sponsored field research or cruise or field data collection/analysis experience. Students who opt for an experience other than the MSCI 460 class must submit a petition for an alternative field experience to the Undergraduate Director. If the alternative is approved, the student must submit a short (2-3 page minimum) report at the completion of the experience to the Undergraduate Director for approval. Upon approval, the Undergraduate Director will notify the Dean’s office of the substitution, and the student’s record will be updated to reflect zero credit hours in MSCI 460 for meeting the field effort requirement. If a student takes the MSCI 460 class (2-credit hours), those credits will be counted towards their 23 major elective credit hours.

Major Electives (23 hours)

Students, in consultation with a faculty advisor, must select 23 hours of major electives. Preferred courses available for major credit are listed below; however, any course which is eligible for cognate credit in the College of Arts and Sciences can potentially be a major course with consent of faculty advisor. Hours used to fulfill an optional concentration toward the fulfillment of the 23 hours of major electives, e.g., students selecting Biological Oceanography would fulfill 13 hours of the 23 hours of required major electives.

Courses Acceptable for Major Credit

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSCI courses numbered 300 and above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSCI 399</td>
<td>Independent Study</td>
<td>1</td>
</tr>
<tr>
<td>MSCI 495</td>
<td>Internship in Marine Science</td>
<td>1</td>
</tr>
<tr>
<td>MSCI 496</td>
<td>Undergraduate Research</td>
<td>1</td>
</tr>
<tr>
<td>MSCI 497</td>
<td>Undergraduate Research</td>
<td>1</td>
</tr>
<tr>
<td>MSCI 498</td>
<td>Undergraduate Research</td>
<td>1</td>
</tr>
<tr>
<td>MSCI 499</td>
<td>Undergraduate Research</td>
<td>1</td>
</tr>
<tr>
<td>MSCI 505</td>
<td>Senior Seminar</td>
<td>1</td>
</tr>
<tr>
<td>MSCI/GEOG 590</td>
<td>Beach-Dune Interactions</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 301</td>
<td>Ecology and Evolution</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 301L</td>
<td>and Ecology and Evolution Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOL 302</td>
<td>Cell and Molecular Biology</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 302L</td>
<td>and Cell and Molecular Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOL 303</td>
<td>Fundamental Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 450</td>
<td>Principles of Biological Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 460</td>
<td>Advanced Human Physiology</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 460L</td>
<td>and Advanced Human Physiology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOL 462</td>
<td>Advanced Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 462L</td>
<td>and Advanced Microbiology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOL 497</td>
<td>Undergraduate Seminar in Biological Sciences</td>
<td>1</td>
</tr>
<tr>
<td>BIOL 505</td>
<td>Developmental Biology</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 505L</td>
<td>and Developmental Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOL 534</td>
<td>Animal Behavior</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 534L</td>
<td>and Animal Behavior Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOL/MSCI 537</td>
<td>Aquaculture</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 541</td>
<td>Biochemistry</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 541L</td>
<td>and Biochemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOL 543</td>
<td>Comparative Physiology</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 543L</td>
<td>and Comparative Physiology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOL 545</td>
<td>Biochemistry/Molecular Biology I</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 549</td>
<td>Plant Physiology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 550</td>
<td>Bacteriology</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 550L</td>
<td>and Bacteriology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOL/MSCI 552</td>
<td>Population Genetics</td>
<td>3</td>
</tr>
</tbody>
</table>
BIOL 570 Principles of Ecology 4
& 570L and Principles of Ecology Laboratory
BIOL 599 Topics in Biology 1 1-3
BIOL 630 Biology of Birds 3
BIOL 640 Microbial Ecology 3
BIOL 652 Evolutionary Biology 3
BIOL 654 Speciation 3
BIOL 670 Plant Ecology 3
BIOL 690 Ulramicroscopy 3
CHEM 321 Quantitative Analysis 4
& 321L and Quantitative Analysis Laboratory
CHEM 331L Essentials of Organic Chemistry Laboratory I 1
CHEM 332L Essentials of Organic Chemistry Laboratory II 1
CHEM 333 Organic Chemistry I 5
& 333L and Comprehensive Organic Chemistry Laboratory I
CHEM 334 Organic Chemistry II 5
& 334L and Comprehensive Organic Chemistry Laboratory II
CHEM 511 Inorganic Chemistry 3
CHEM 541 Physical Chemistry 5
& 541L and Physical Chemistry Laboratory 1
CHEM 542 Physical Chemistry 5
& 542L and Physical Chemistry Laboratory
CHEM 621 Instrumental Analysis 3
CSCE 561 Numerical Analysis 3
ECIV 360 Fluid Mechanics 3
ECON 548 Environmental Economics 3
ENHS 665 Biofilms in Environmental Health and Disease 3
ENVR 231 Introduction to Sustainability Management and Leadership 3-4
ENVR 548 Environmental Economics 3
ENVR 571 Conservation Biology 3
ENVR 572 Freshwater Ecology 3
ENVR 480 Capstone Seminar in Environmental Science and Environmental Studies 3
GEOG 263 Geographic Information Systems 3
GEOG 341 Cartography 3
GEOG 345 Introduction to Remote Sensing 3
GEOG 365 Hurricanes and Tropical Climatology 3
GEOG 510 Special Topics in Geographic Research 3
GEOG 516 Coastal Zone Management 3
GEOG 541 Advanced Cartography 3
GEOG 545 Weather Analysis and Forecasting 4
GEOG 546 Applied Climatology 4
GEOG 551 Remote Sensing of the Environment 3
GEOG 554 Spatial Programming 3
GEOG 563 Advanced Geographic Information Systems 3
GEOG 564 GIS-Based Modeling 3
GEOL 305 Earth Systems through Time 4
GEOL 315 Surface and Near Surface Processes 4
GEOL 325 Stratigraphy and Sedimentary Basins 4
GEOL 335 Processes of Global Environmental Change 4
GEOL 345 Igneous and Metamorphic Processes 4
GEOL 355 Structural Geology and Tectonics 4
GEOL 371 A View of the River 3
GEOL 500 Field Geology 4-6
GEOL 503 Regional Stratigraphy and Biostratigraphy of North America 3
GEOL 516 Sedimentology 4
GEOL 541 Earth Science for Teachers II 3
GEOL 545 Geological Oceanography 3
GEOL 546 Marine Geophysics 3
GEOL 555 Elementary Seismology 3
GEOL 570 Environmental Hydrogeology 3
JOUR 507 Health Communication: The Science and Practice 3
MATH 241 Vector Calculus 3
MATH 242 Elementary Differential Equations 3
MATH 344 Applied Linear Algebra 3
MATH 344L Applied Linear Algebra Lab 1
MATH 520 Ordinary Differential Equations 3
MATH 521 Boundary Value Problems and Partial Differential Equations 3
MATH 526 Numerical Linear Algebra 4
MATH 527 Numerical Analysis 3
MATH 544 Linear Algebra 3
NAVY 301 Navigation/Naval Operations I 4
& 301L and Navigation/Naval Operations Lab I
NAVY 302 Navigation/Naval Operations II 4
& 302L and Navigation/Naval Operations Lab II
PHYS 311 Introduction to Applied Numerical Methods 3
PHYS 515 Mathematical Physics I 3
PHYS 516 Mathematical Physics II 3
POLI 370 Introduction to Public Administration 3
POLI 399A Independent Study in Political Science 1-6
POLI 399B Independent Study in International Studies 1-6
POLI 420 International Law 3
POLI 431 Science, Technology, and Public Policy 3
POLI 477 Green Politics 3
SCHC 390-SCHC 398 1
SCHC 499 HNRS: Senior Thesis/Project 1 1-15
SOCY 310 Social Demography 3
SOCY 315 Global Population Issues 3
STAT 506 Introduction to Experimental Design 3
STAT 511 Probability 3
STAT 512 Mathematical Statistics 3
STAT 513 Theory of Statistical Inference 3
STAT 516 Statistical Methods II 3
STAT 518 Nonparametric Statistical Methods 3

1 A maximum of 10 hours of independent study, seminar, and undergraduate research courses may count in the 23 hours of major electives required for the Marine Science major.

Note: Credit for a degree will not be given for both CHEM 340 and CHEM 541.
Concentrations (12-15 hours)

Students may elect to have a Concentration specified directly on their academic transcript upon graduation from the Marine Science Program. In order to earn a Concentration certification, students must take the following courses, with an additional course(s) to be decided upon by the student and his or her Faculty Advisor. These courses may also be included in the 36 major credit hours required for graduation.

Biological Oceanography (13 hours minimum)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 301</td>
<td>Ecology and Evolution</td>
<td>4</td>
</tr>
<tr>
<td>&amp; 301L</td>
<td>Ecology and Evolution Laboratory (Lab not required)</td>
<td></td>
</tr>
<tr>
<td>BIOL 302</td>
<td>Cell and Molecular Biology (Lab not required)</td>
<td>3</td>
</tr>
<tr>
<td>or BIOL 302L</td>
<td>Cell and Molecular Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td>or BIOL 303</td>
<td>Fundamental Genetics</td>
<td></td>
</tr>
</tbody>
</table>

Select two additional courses (six hours minimum) from the following list of marine biology, ecology, biology courses or similar courses as approved by advisor:

- MSCI 375 The Deep Sea
- MSCI/BIOL 450 Principles of Biological Oceanography
- MSCI 503/ BIOL 502 Environmental Microbiology
- MSCI/BIOL 510 Invertebrate Zoology
- MSCI/BIOL 525 Marine Plants
- MSCI/BIOL 535 Fishery Management
- MSCI/BIOL 536 Ichthyology
- MSCI/BIOL 537 Aquaculture
- MSCI/BIOL 538 Behavior of Marine Organisms
- MSCI/BIOL 552 Population Genetics
- MSCI/BIOL 574 Marine Conservation Biology
- MSCI/BIOL 575 Marine Ecology
- MSCI/BIOL 576 Marine Fisheries Ecology
- MSCI/BIOL 577 Ecology of Coral Reefs
- MSCI/BIOL 627 Marine Phytoplankton
- MSCI 496 Undergraduate Research (if biology oriented)
- MSCI 497 Undergraduate Research (if biology oriented)
- MSCI 498 Undergraduate Research (if biology oriented)
- MSCI 499 Undergraduate Research (if biology oriented)
- MSCI 599 Topics in Marine Science (if biology oriented)
- MSCI 566 Ecosystem Analysis
- MSCI 578 Physiological and Pollution Ecology of Marine Organisms

Total Credit Hours 13

1. CHEM 333 is a prerequisite for BIOL 302 and is recommended for those intending to complete postgraduate work in this area of emphasis.

Chemical Oceanography (13 hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 321</td>
<td>Quantitative Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 321L</td>
<td>Quantitative Analysis Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 333</td>
<td>Organic Chemistry I (Lab not required)</td>
<td>3</td>
</tr>
<tr>
<td>or CHEM 333L</td>
<td>Comprehensive Organic Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td>CHEM 334</td>
<td>Organic Chemistry II (Lab not required)</td>
<td>3</td>
</tr>
<tr>
<td>or CHEM 334L</td>
<td>Comprehensive Organic Chemistry Laboratory II</td>
<td></td>
</tr>
</tbody>
</table>

One more Chemical Oceanography course at the 400-level or above

Total Credit Hours 13

Coastal Resource Management & Marine Policy (12 hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSCI 390</td>
<td>Policy and Marine Science</td>
<td>3</td>
</tr>
<tr>
<td>GEG 516</td>
<td>Coastal Zone Management</td>
<td>3</td>
</tr>
<tr>
<td>ENVR 548</td>
<td>Environmental Economics</td>
<td>3</td>
</tr>
</tbody>
</table>

One more Coastal Resource Management & Marine Policy course at the 400-level or above

Total Credit Hours 12

1. ENVR 548 requires a prerequisite of ECON 221 and ECON 222 or ECON 224.

Geological Oceanography (15 hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOL 302</td>
<td>Rocks and Minerals</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 305</td>
<td>Earth Systems through Time</td>
<td>4</td>
</tr>
<tr>
<td>Course</td>
<td>Title</td>
<td>Credits</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>MATH 241</td>
<td>Vector Calculus</td>
<td>3</td>
</tr>
<tr>
<td>MATH 242</td>
<td>Elementary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>Select two of the following:</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>MSCI 509</td>
<td>MATLAB-Based Data Analysis in Ocean Sciences</td>
<td></td>
</tr>
<tr>
<td>MSCI 557</td>
<td>Coastal Processes</td>
<td></td>
</tr>
<tr>
<td>MSCI 579</td>
<td>Air-Sea Interaction</td>
<td></td>
</tr>
<tr>
<td>MSCI/GEOL 580</td>
<td>Satellite Oceanography</td>
<td></td>
</tr>
<tr>
<td>MSCI 581</td>
<td>Estuarine Oceanography</td>
<td></td>
</tr>
<tr>
<td>MSCI 582</td>
<td>Marine Hydrodynamics</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours: 12

1 Courses are taught alternate years. Please check teaching schedule.
2 Students in the Physical Oceanography concentration must take PHYS 211 & PHYS 211L and PHYS 212 & PHYS 212L.

Major Map

A major map is a layout of required courses in a given program of study, including critical courses and suggested course sequences to ensure a clear path to graduation.

Major maps are only a suggested or recommended sequence of courses required in a program of study. Please contact your academic advisor for assistance in the application of specific coursework to a program of study and course selection and planning for upcoming semesters.

Marine Science, B.S. No Concentration

Marine Science, B.S. Biological Oceanography Concentration

Marine Science, B.S. Chemical Oceanography Concentration

Marine Science, B.S. Coastal Resource Mgmt. & Marine Affairs Concentration

Marine Science, B.S. Geological Oceanography Concentration

Marine Science, B.S. Physical Oceanography Concentration