OCEANOGRAPHY - BS

The BS in Oceanography curriculum: 1) Provides students with an interdisciplinary understanding of the oceans and the processes affecting them for use in careers in marine science or other related fields; 2) Provides students with the skills to retrieve, evaluate, and analyze large oceanographic datasets such as those generated from long term oceanographic studies and observing systems; and 3) Emphasizes critical thinking and problem solving skills.

The BS in Oceanography has four themes: Ocean Observing Science and Technology (OOST), Ocean Climate (OC), Marine Ecosystem Processes (MEP) and Marine Chemistry and Geochemistry (MCG). All four themes share common requirements but allow for specialization depending on a student’s interest. The OOST theme provides more emphasis in statistics and ocean observing systems; all students will gain skill in handling, evaluating and analyzing large datasets. The OC theme provides more emphasis in advanced math skills that can be applied to understanding ocean climate interactions; all students will gain skill in handling, evaluating and analyzing large datasets. The MEP theme provides more emphasis in biological and ecological processes; all students will gain skill in understanding and applying a biological framework to understanding the ocean. The MCG theme provides more emphasis on marine chemistry and geochemistry; all students will gain skill in understanding and applying a chemical and geochemical framework to understanding the ocean.

Many graduates will obtain jobs in a variety of fields including marine technical support, energy and transportation industries, insurance industries, hazard mitigation, marine operations, homeland security, oil spill response, etc. Students planning on attending graduate school are encouraged to also complete a minor in a STEM field.

For additional information, please visit https://ocean.tamu.edu/.

Program Requirements

First Year

**Fall**  
CHEM 119  
Fundamentals of Chemistry I  
4
ENGL 104  
Composition and Rhetoric  
3
MATH 151  
Engineering Mathematics I 1  
4
OCNG 101  
Succeeding in Oceanography  
1
OCNG 251 & OCNG 252  
The Blue Planet - Our Oceans and The Blue Planet - Our Oceans Laboratory  
4

**Spring**  
BIOL 111  
Introductory Biology I  
4
CHEM 120  
Fundamentals of Chemistry II  
4
MATH 152  
Engineering Mathematics II 1  
4
American history (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#american-history)  
3

Second Year

**Fall**  
BIOL 112  
Introductory Biology II  
4
OCNG 203  
Communicating Oceanography  
1
STAT 211  
Principles of Statistics I  
3
PHYS 206 & PHYS 226  
Newtonian Mechanics for Engineering and Science and Physics of Motion Laboratory for the Sciences  
4
Creative arts (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#creative-arts)  
3

**Spring**  
OCNG 330  
Geological Oceanography  
3
COMM 203 or COMM 205  
Public Speaking or Communication for Technical Professions  
3
PHYS 207 & PHYS 227  
Electricity and Magnetism for Engineering and Science and Electricity and Magnetism Laboratory for the Sciences  
4
American history (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#american-history)  
3
Theme requirement 2,3  
3-4

**Third Year**

**Fall**  
OCNG 310  
Physical Oceanography  
3
OCNG 456 or OCNG 469  
MATLAB Programming for Ocean Sciences or Python for Geosciences  
3
Government/Political science (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#government-political-science)  
3
Theme requirement 2,3  
3-4
Theme elective 2  
3

**Spring**  
OCNG 303  
Professional Communication in Oceanography  
3
OCNG 320  
Biological Oceanography  
3
OCNG 340  
Chemical Oceanography  
3
OCNG 443  
Oceanographic Field and Laboratory Methods  
3
Theme elective 2,4  
2-3

**Fourth Year**

**Fall**  
OCNG 470  
Data Analysis Methods in Geosciences  
4
Social and behavioral sciences (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#social-behavioral-sciences)  
3
Technical elective 5  
3
### Oceanography - BS

**Theme elective**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 351</td>
<td>Marine Ecosystem Processes Theme</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 357</td>
<td>Ecology</td>
<td>3</td>
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</tbody>
</table>

Select 12 hours from the following:

- BIOL 213 Molecular Cell Biology
- BIOL 335 Invertebrate Zoology
- BIOL 351 Fundamentals of Microbiology
- BIOL 440 Marine Biology
- BIOL 451 Bioinformatics
- CHEM 383 Chemistry of Environmental Pollution
- GENE 302 Principles of Genetics
- GEOS 410 Global Change
- OCNG 350 Marine Pollution

**Spring**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>OCNG 461</td>
<td>Advanced Oceanographic Data Analysis and Communication</td>
<td>3</td>
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Government/Political science

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<tr>
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<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Government/Political science</td>
<td>3</td>
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</table>

Language, philosophy and culture

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<tr>
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<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td>Language, philosophy and culture</td>
<td>3</td>
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</table>

Technical elective

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Technical elective</td>
<td>3</td>
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**Theme elective**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Theme elective</td>
<td>2 or 3</td>
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</table>

**Total Semester Credit Hours**

<table>
<thead>
<tr>
<th>Code</th>
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<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Semester Credit Hours</td>
<td>12</td>
</tr>
</tbody>
</table>

A grade of C or better is required.

Select one of the following themes: Marine Ecological Processes, Marine Chemistry & Geochemistry, Ocean Climate, Ocean Observing Science and Technology.

If Marine Chemistry and Geochemistry theme is chosen, this will be 2 credits instead of 3 credits.

If Marine Chemistry and Geochemistry theme is chosen, this will be 4 credits instead of 3 credits.


**Total Semester Credit Hours**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Semester Credit Hours</td>
<td>20</td>
</tr>
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</table>

### Marine Chemistry and Geochemistry Theme

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CHEM 227</td>
<td>Organic Chemistry I and Organic Chemistry Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 228</td>
<td>Organic Chemistry II and Organic Chemistry Laboratory</td>
<td>4</td>
</tr>
</tbody>
</table>

Select 10 hours from the following:

- ATMO 363 Introduction to Atmospheric Chemistry and Air Pollution
- CHEM 315 Fundamentals of Quantitative Analysis
- CHEM 362 Descriptive Inorganic Chemistry
- CHEM 383 Chemistry of Environmental Pollution
- CHEM 415 Analytical Chemistry
- CHEM 483 Green Chemistry
- GEOS 443 Global Biogeochemical Cycles
- GEOL 451 Introduction to Geochemistry
- OCNG 350 Marine Pollution
- OCNG 411 Global Oceanography
- OCNG 425 Microbial Oceanography
- OCNG 453 Hydrothermal Vents and Mid-Ocean Ridges
- OCNG 456 MATLAB Programming for Ocean Sciences
- OCNG 469 Python for Geosciences
- OCNG 491 Research (limit to 3 credits)

**Total Semester Credit Hours**

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Semester Credit Hours</td>
<td>18</td>
</tr>
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</table>

### Ocean Climate Theme

<table>
<thead>
<tr>
<th>Code</th>
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<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
<td>3</td>
</tr>
<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
<td>3</td>
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</table>

Select 12 hours from the following:

- ATMO 201 Weather and Climate
- ATMO 203 Weather Forecasting Laboratory
- ATMO 210 Climate Change
- ATMO 324 Physical and Regional Climatology
- ATMO 441 Satellite Meteorology and Remote Sensing
<table>
<thead>
<tr>
<th>Code</th>
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<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 442</td>
<td>Past Climates</td>
<td></td>
</tr>
<tr>
<td>GEOS 442</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 304</td>
<td>Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>OCNG 411</td>
<td>Global Oceanography</td>
<td></td>
</tr>
<tr>
<td>OCNG 451</td>
<td>Mathematical Modeling of Ocean Climate</td>
<td></td>
</tr>
<tr>
<td>OCNG 456</td>
<td>MATLAB Programming for Ocean Sciences</td>
<td></td>
</tr>
<tr>
<td>OCNG 469</td>
<td>Python for Geosciences</td>
<td></td>
</tr>
<tr>
<td>OCNG 491</td>
<td>Research (limit to 3 credits)</td>
<td></td>
</tr>
<tr>
<td>PHYS 221</td>
<td>Optics and Thermal Physics</td>
<td></td>
</tr>
<tr>
<td>STAT 212</td>
<td>Principles of Statistics II</td>
<td></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours: 18**

**Ocean Observing Science and Technology Theme**

- STAT 212  **Principles of Statistics II**  3
- OCNG 404  **Ocean Observing Systems**  3

Select 12 hours from the following:  12

- ATMO 201  **Weather and Climate**
- ATMO 203  **Weather Forecasting Laboratory**
- ATMO 251  **Weather Observation and Analysis**
- GEOG 361  **Remote Sensing in Geosciences**
- OCNG 350  **Marine Pollution**
- OCNG 411  **Global Oceanography**
- OCNG 456  **MATLAB Programming for Ocean Sciences**
- OCNG 469  **Python for Geosciences**
- OCNG 491  **Research (limit to 3 credits)**
- STAT 407  **Principles of Sample Surveys**

**Total Semester Credit Hours: 18**