Marine Science Program

The College of Arts and Sciences offers interdisciplinary marine science double major programs (marine science/biology, marine science/chemistry and marine science/geology) culminating in the bachelor of science (BS) degree. These double major curricula give the student a focused exposure to include general education requirements, single disciplinary requirements and the interdisciplinary courses that represent studies in the field of marine science. A minor in marine science is available to students whose major fields are biology, chemistry or geology.

Marine Science/Biology Major (BS)

Department of Biological Sciences
1324 Science and Engineering Complex
bsc.ua.edu
marinescience@as.ua.edu

Degree Requirements

Students earning the bachelor of science (BS) degree in marine science/biology must complete all university, college and departmental degree requirements. These include the general education requirements, the following double major requirements and other sufficient credits to total a minimum of 120 applicable semester hours.

Admission into the Major

Students are expected to formally declare both majors no later than the fourth semester of full-time enrollment (or at 61 semester hours for transfer students). Students can declare a major by completing the Change of Major/Minor Application online under the Student tab of myBama.

Grade Point Average

A 2.0 grade point average in each major is required for completion of the degree. Please see the Grades and Grade Point Average (GPA) section of this catalog for an explanation on grade point average calculations.

Major Courses

The majors in marine science/biology require the successful completion of the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC 114 &amp; BSC 115 or 116</td>
<td>Principles Of Biology I and Laboratory Biology I</td>
<td>4</td>
</tr>
<tr>
<td>BSC 118</td>
<td>Honors General Biology I</td>
<td>4</td>
</tr>
<tr>
<td>BSC 116 &amp; BSC 117 or 118</td>
<td>Principles Biology II and Biology II Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>BSC 120</td>
<td>Honors Gen Biology II</td>
<td>3</td>
</tr>
<tr>
<td>BSC 300</td>
<td>Cell Biology</td>
<td>3</td>
</tr>
<tr>
<td>BSC 315</td>
<td>Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BSC 385</td>
<td>Ecology and Evolution</td>
<td>3</td>
</tr>
<tr>
<td>BSC electives above 250</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>CH 101 or 102</td>
<td>General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CH 117</td>
<td>Honors General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CH 118</td>
<td>Honors General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>GEO 101</td>
<td>The Dynamic Earth</td>
<td>4</td>
</tr>
<tr>
<td>GEO 102 or 103</td>
<td>The Earth Through Time</td>
<td>4</td>
</tr>
<tr>
<td>GEO 105</td>
<td>Sustainable Earth</td>
<td>4</td>
</tr>
<tr>
<td>MS 304</td>
<td>Marine Geology</td>
<td>4</td>
</tr>
<tr>
<td>MS 306</td>
<td>Marine Biology</td>
<td>4</td>
</tr>
<tr>
<td>MS 448</td>
<td>Intro Oceanography</td>
<td>4</td>
</tr>
<tr>
<td>MS elective 300 or 400 level</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

One of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH 101</td>
<td>General Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PH 105</td>
<td>General Physics W/Calc I</td>
<td>4</td>
</tr>
<tr>
<td>PH 125</td>
<td>Honors Gen Ph W/Calculus</td>
<td>4</td>
</tr>
</tbody>
</table>

One of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH 102</td>
<td>General Physics II</td>
<td>4</td>
</tr>
<tr>
<td>PH 106</td>
<td>General Physics W/Calc II</td>
<td>4</td>
</tr>
<tr>
<td>PH 126</td>
<td>Honors Gen Ph W/Calculus</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Hours 72

* Consult the marine science coordinator for appropriate MS electives.
** Other BSC courses numbered 250 and above including two laboratory courses from the following list of laboratory courses (also see "Additional Major Requirements"):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC 310</td>
<td>Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>BSC 313</td>
<td>Gen Bacteriology Lab</td>
<td>3</td>
</tr>
<tr>
<td>BSC 320</td>
<td>Freshwater Studies</td>
<td>4</td>
</tr>
<tr>
<td>BSC 360</td>
<td>Plant Biology</td>
<td>4</td>
</tr>
<tr>
<td>BSC 373</td>
<td>Vertebrate Zoology</td>
<td>4</td>
</tr>
<tr>
<td>BSC 376</td>
<td>Invertebrate Zoology</td>
<td>4</td>
</tr>
<tr>
<td>BSC 390</td>
<td>Honors Thesis Research</td>
<td>1-8</td>
</tr>
<tr>
<td>BSC 396</td>
<td>Resident Study</td>
<td>1-6</td>
</tr>
<tr>
<td>BSC 398</td>
<td>Undergraduate Research</td>
<td>1-4</td>
</tr>
<tr>
<td>BSC 400</td>
<td>Vertebrate Funct Morphol</td>
<td>4</td>
</tr>
<tr>
<td>BSC 425</td>
<td>Human Physiology Lab</td>
<td>2</td>
</tr>
<tr>
<td>BSC 428</td>
<td>Biology Of Fishes</td>
<td>4</td>
</tr>
<tr>
<td>BSC 432</td>
<td>Pathogenic Microbiol Lab</td>
<td>3</td>
</tr>
<tr>
<td>BSC 434</td>
<td>Plant Systematics</td>
<td>4</td>
</tr>
<tr>
<td>BSC 436</td>
<td>Immunology Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>BSC 439</td>
<td>Bch/Molecular Biology Lab</td>
<td>3</td>
</tr>
<tr>
<td>BSC 442</td>
<td>Integrated Genomics</td>
<td>4</td>
</tr>
<tr>
<td>BSC 460</td>
<td>Human Developmental Biology</td>
<td>4</td>
</tr>
<tr>
<td>BSC 464</td>
<td>Biology Of Algae</td>
<td>4</td>
</tr>
<tr>
<td>BSC 469</td>
<td>Histology Of Vertebrates</td>
<td>4</td>
</tr>
<tr>
<td>BSC 472</td>
<td>Mycology</td>
<td>4</td>
</tr>
<tr>
<td>BSC 475</td>
<td>General Entomology</td>
<td>4</td>
</tr>
<tr>
<td>BSC 476</td>
<td>Aquatic Insects</td>
<td>4</td>
</tr>
<tr>
<td>BSC 490</td>
<td>Stream Ecology</td>
<td>4</td>
</tr>
<tr>
<td>MS 306</td>
<td>Marine Biology</td>
<td>4</td>
</tr>
<tr>
<td>MS 408</td>
<td>Marine Invertebrate Zoology</td>
<td>4</td>
</tr>
<tr>
<td>MS 419</td>
<td>Marine Ecology</td>
<td>4</td>
</tr>
<tr>
<td>MS 425</td>
<td>Marine Vertebrate Zoology</td>
<td>4</td>
</tr>
<tr>
<td>MS 453</td>
<td>Marine Botany</td>
<td>4</td>
</tr>
</tbody>
</table>

Upper-level Residency

A minimum of 12 hours of 300- and 400-level courses in each major must be earned on this campus.

Ancillary Courses

Grades in ancillary courses are not computed in the major GPA. The major in marine science/biology requires the successful completion of the following courses outside the major:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH 231</td>
<td>Elem Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 125 or 126</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 145</td>
<td>Honors Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>ST 260 or 261</td>
<td>Statistical Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>BSC 380</td>
<td>Introduction to probability and statistics for biologists</td>
<td>3</td>
</tr>
</tbody>
</table>

Required Minor

Marine science/biology does not require a minor.

Additional Major Requirements

Students are not permitted to count the same required major courses toward completion of a second major or minor. Students may count required ancillary courses for one major toward the requirements of another major. The biology department offers a number of courses designed to enrich the learning experience of students beyond the traditional classroom setting. These courses include:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC 391</td>
<td>Tutorial In Biol Science</td>
<td>1-2</td>
</tr>
<tr>
<td>BSC 396</td>
<td>Resident Study</td>
<td>1-6</td>
</tr>
<tr>
<td>BSC 398</td>
<td>Undergraduate Research</td>
<td>1-4</td>
</tr>
<tr>
<td>BSC 403</td>
<td>Intro To Bsc Instruction</td>
<td>2</td>
</tr>
</tbody>
</table>
Beyond specific restrictions listed for each course, a total of four hours from the group above, may be applied to the requirements of the biology major or minor. An additional four hours may be applied as electives to the requirement for 120 hours for the degree.

Students are responsible for ensuring that they have met all University, College, major and minor requirements. However, each student must meet with an adviser in the major department for academic planning and to be approved for registration each semester. College advisers are also available for additional assistance with minor, College and University requirements.

Special Opportunities
During the summer semester, a large suite of marine science courses is offered at the Dauphin Island campus of the Alabama Marine Environmental Sciences Consortium.

Marine Science/Chemistry Major (BS)
Department of Biological Sciences
1324 Science and Engineering Complex
bssc.ua.edu
marinescience@as.ua.edu
Department of Chemistry
206 Shelby Hall
bama.ua.edu/~chem
chemistry@as.ua.edu

Degree Requirements
Students earning the bachelor of science (BS) degree in marine science/chemistry must complete all University, College and departmental degree requirements. These include the general education requirements, the following double major requirements and other sufficient credits to total a minimum of 120 applicable semester hours.

Admission into the Major
Students are expected to formally declare both majors no later than the fourth semester of full-time enrollment (or at 61 semester hours for transfer students). Students can declare a major by completing the Change of Major/Minor Application online under the Student tab of myBama.

Grade Point Average
A 2.0 grade point average in each major is required for completion of the degree. Please see the Grades and Grade Point Average (GPA) section of this catalog for an explanation on grade point average calculations.

Major Courses
The major in marine science/chemistry requires the successful completion of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC 114 Principles of Biology I</td>
<td>4</td>
</tr>
<tr>
<td>BSC 115 or BSC 118 Honors General Biology I</td>
<td>4</td>
</tr>
<tr>
<td>BSC 116 Principles of Biology II</td>
<td>4</td>
</tr>
<tr>
<td>BSC 117 or BSC 118 Honors Biology II Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>BSC 120 Honors General Biology II</td>
<td>4</td>
</tr>
<tr>
<td>CH 101 or CH 102 General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CH 117 Honors General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CH 118 Honors General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CH 223 Quantitative Analysis</td>
<td>4</td>
</tr>
<tr>
<td>CH 231 Elem Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CH 232 Elem Organic Chemistry II &amp; CH 237 Elem Organic Chemistry Lab</td>
<td>5</td>
</tr>
<tr>
<td>CH 338 Elem Organic Chemistry Lab II</td>
<td>2</td>
</tr>
<tr>
<td>CH 340 Elem Physical Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CH 341 Elem Physical Laboratory &amp; CH 343 Elem Physical Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>CH 461 Biochemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CH 462 Biochemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CH 463 Biochem-Clin/Foren/Chem</td>
<td>3</td>
</tr>
<tr>
<td>GEO 101 The Dynamic Earth</td>
<td>4</td>
</tr>
<tr>
<td>GEO 102 or GEO 105 The Earth Through Time</td>
<td>4</td>
</tr>
<tr>
<td>MS elective 300 or 400 level</td>
<td>75</td>
</tr>
</tbody>
</table>

Select one of the following:
- PH 101 General Physics I
- PH 105 General Physics W/Calc I
- PH 125 Honors Gen Ph W/Calculus

Select one of the following:
- PH 102 General Physics II
- PH 106 Generl Phys W/Calc II
- PH 126 Honors Gen Ph W/Calculus

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 304 Marine Geology</td>
<td>4</td>
</tr>
<tr>
<td>MS 306 Marine Biology</td>
<td>4</td>
</tr>
<tr>
<td>MS 448 Intro Oceanography</td>
<td>4</td>
</tr>
<tr>
<td>ST 260 Statistical Data Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

Required Minor
Marine science/chemistry does not require a minor.

Additional Major Requirements
Students are not permitted to count the same required major courses toward completion of a second major or minor. Students may count required ancillary courses for one major toward the requirements of another major. Students are responsible for ensuring that they have met all University, College, major and minor requirements. However, each student must meet with an adviser in the major department for academic planning and to be approved for registration each semester. College advisers are also available for additional assistance with minor, College and University requirements.

Special Opportunities
During the summer semester, a large suite of marine science courses is offered at the Dauphin Island campus of the Alabama Marine Environmental Sciences Consortium.

Marine Science/Geology Major (BS)
Department of Biological Sciences
1324 Science and Engineering Complex
bssc.ua.edu
marinescience@as.ua.edu
Department of Geological Sciences
202 Bevill Building
geo.ua.edu
geology@as.ua.edu

Degree Requirements
Students earning the bachelor of science (BS) degree in marine science/geology must complete all University, college and departmental degree requirements. These include the general education requirements, the following double major requirements and other sufficient credits to total 128 applicable semester hours.

Admission into the Major
Students are expected to formally declare both majors no later than the fourth semester of full-time enrollment (or at 61 semester hours for transfer students). Students can declare a major by completing the Change of Major/Minor Application online under the Student tab of myBama.

Grade Point Average
A 2.0 grade point average in each major is required for completion of the degree. Please see the Grades and Grade Point Average (GPA) section of this catalog for an explanation on grade point average calculations.
**Major Courses**

The major in marine science/geology requires the successful completion of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC 114</td>
<td>Principles Of Biology I and Laboratory Biology I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; BSC 115 or</td>
<td>Honors General Biology I</td>
<td></td>
</tr>
<tr>
<td>BSC 118</td>
<td>Honors General Biology I</td>
<td></td>
</tr>
<tr>
<td>BSC 116</td>
<td>Principles Biology II and Biology II Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>&amp; BSC 117 or</td>
<td>Honors Gen Biology II</td>
<td></td>
</tr>
<tr>
<td>BSC 120</td>
<td>Honors Gen Biology II</td>
<td></td>
</tr>
<tr>
<td>CH 101 or</td>
<td>General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CH 117</td>
<td>Honors General Chemistry</td>
<td></td>
</tr>
<tr>
<td>CH 102 or</td>
<td>General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CH 118</td>
<td>Honors General Chemistry</td>
<td></td>
</tr>
<tr>
<td>GEO 101</td>
<td>The Dynamic Earth</td>
<td>4</td>
</tr>
<tr>
<td>GEO 102</td>
<td>The Earth Through Time</td>
<td>4</td>
</tr>
<tr>
<td>GEO 210</td>
<td>Mineralogy</td>
<td>4</td>
</tr>
<tr>
<td>GEO 314</td>
<td>Ig; Meta. Petrology</td>
<td>4</td>
</tr>
<tr>
<td>GEO 365</td>
<td>Structural Geology</td>
<td>3</td>
</tr>
<tr>
<td>GEO 367</td>
<td>Sedimentology/Stratigraphy</td>
<td>4</td>
</tr>
<tr>
<td>GEO 495</td>
<td>Field Geology</td>
<td>6</td>
</tr>
</tbody>
</table>

Select two of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO 335</td>
<td>Invertebrate Paleontology</td>
<td>6</td>
</tr>
<tr>
<td>GEO 369</td>
<td>Introduction Geophysics</td>
<td></td>
</tr>
<tr>
<td>GEO 470</td>
<td>General Geochemistry</td>
<td></td>
</tr>
<tr>
<td>GEO electives</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>MS 304</td>
<td>Marine Geology</td>
<td>4</td>
</tr>
<tr>
<td>MS 306</td>
<td>Marine Biology</td>
<td>4</td>
</tr>
<tr>
<td>MS 448</td>
<td>Intro Oceanography</td>
<td>4</td>
</tr>
<tr>
<td>MS elective 300 or 400 level</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH 101</td>
<td>General Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PH 105</td>
<td>General Physics W/Calc I</td>
<td></td>
</tr>
<tr>
<td>PH 125</td>
<td>Honors Gen Ph W/Calculus</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH 102</td>
<td>General Physics II</td>
<td>4</td>
</tr>
<tr>
<td>PH 106</td>
<td>General Physics W/Calc II</td>
<td></td>
</tr>
<tr>
<td>PH 126</td>
<td>Honors Gen Ph W/Calculus</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours 81

* Consult the Marine Science coordinator for appropriate MS electives.

**Upper-level Residency**

A minimum of 12 hours of 300- and 400-level courses in each major must be earned on this campus.

**Ancillary Courses**

Grades in ancillary courses are not computed in the major GPA. The major in marine science/geology requires the successful completion of the following courses outside the major:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 125 or</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 145</td>
<td>Honors Calculus I</td>
<td></td>
</tr>
<tr>
<td>MATH 126 or</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 146</td>
<td>Honors Calculus II</td>
<td></td>
</tr>
<tr>
<td>ST 260</td>
<td>Statistical Data Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

**Required Minor**

Marine science/chemistry does not require a minor.

**Additional Major Requirements**

Students are not permitted to count the same required major courses toward completion of a second major or minor. Students may count required ancillary courses for one major toward the requirements of another major. Students are responsible for ensuring that they have met all University, College, major and minor requirements. However, each student must meet with an adviser in the major department for academic planning and to be approved for registration each semester. College advisers are also available for additional assistance with minor, College and University requirements.

**Special Opportunities**

During the summer semester, a large suite of marine science courses is offered at the Dauphin Island campus of the Alabama Marine Environmental Sciences Consortium.

**Marine Science Minor**

Department of Biological Sciences
1324 Science and Engineering Complex
bsc.ua.edu
marinescience@as.ua.edu

**Admission into the Minor**

Students are expected to formally declare a minor by completing the Change of Major/Minor Application online under the Student tab of myBama.

**Grade Point Average**

A 2.0 grade point average in the minor is required for completion of the degree. Please see the Grades and Grade Point Average (GPA) section of this catalog for an explanation on grade point average calculations.

**Minor Courses**

The minor in marine science requires the successful completion of the following 22 semester hours:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select a sequence in BSC or GEO chosen from:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSC 114 &amp; BSC 115 or</td>
<td>Principles Of Biology I and Laboratory Biology I</td>
<td>8</td>
</tr>
<tr>
<td>or</td>
<td>Honors General Biology I</td>
<td></td>
</tr>
<tr>
<td>BSC 118 &amp; BSC 117 or</td>
<td>Principles Biology II and Biology II Laboratory</td>
<td></td>
</tr>
<tr>
<td>or</td>
<td>Honors Gen Biology II</td>
<td></td>
</tr>
<tr>
<td>GEO 101 &amp; GEO 102 or</td>
<td>The Dynamic Earth and The Earth Through Time</td>
<td>14</td>
</tr>
<tr>
<td>or GEO 101 &amp; GEO 105 or</td>
<td>The Dynamic Earth &amp; Sustainable Earth</td>
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<td>Select courses from the following:</td>
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<tr>
<td>MS 306</td>
<td>Marine Biology</td>
<td>4</td>
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<tr>
<td>MS 408</td>
<td>Marine Invertebrate Zoology</td>
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<tr>
<td>MS 448</td>
<td>Intro Oceanography</td>
<td>4</td>
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<tr>
<td>GEO 355</td>
<td>Invertebrate Paleontology</td>
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<tr>
<td>GEO 367</td>
<td>Sedimentology/Stratigraphy</td>
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Total Hours 22

**Upper-level Residency**

A minimum of six hours of 300- and 400-level courses in the minor must be earned on this campus.

**Ancillary Courses**

This minor does not require ancillary courses.

**Additional Minor Requirements**

Students are not permitted to count the same required minor course toward completion of a major or second minor. Students may count required ancillary courses toward the requirements of another major. Students are responsible for ensuring that they have met all University, College, major and minor requirements. However, each student must meet with an adviser in the major department for academic planning and to be approved for registration each semester. College advisers are also available for additional assistance with minor, College and University requirements.

**Special Opportunities**

During the summer semester, a large suite of marine science courses is offered at the Dauphin Island campus of the Alabama Marine Environmental Sciences Consortium.
### Biological Sciences (BSC) Courses

**BSC 108. Intro Biology Non Maj I. 4 sem. hrs.**  
Lecture and laboratory. Not open to biology majors or minors, pre-health professions students, or students with credit for BSC 114:115 and BSC 116:117 (or the honors equivalents, BSC 118 and BSC 120). Survey of the basic principles of cellular biology, genetics, plant and animal diversity, and evolution. Usually offered fall, spring, and summer. BSC 108 and BSC 109 may be taken in either order.

**BSC 109. Intro Biology Non Maj II. 4 sem. hrs.**  
Lecture and laboratory. Not open to biology majors or minors, or to pre-health professions students. Study of the physiology of living organisms with emphasis on the physiology of humans. Includes an overview of general ecology and animal behavior. Usually offered fall, spring and summer. BSC 108 and BSC 109 may be taken in either order.

**BSC 114. Principles Of Biology I. 3 sem. hrs.**  
For biology majors, biology minors and pre-health professions students. Study of general biological principles, including the chemical basis of life; cellular biology, including cell structure and metabolism, genetics, evolution; and a survey of simple organisms, including viruses, bacteria, protista and fungi. Offered fall, spring and summer. NOTE: A student must take both BSC 114 and BSC 115 in order to use either one of the courses to satisfy a portion of the natural science (N) requirement of the University Core Curriculum.

**BSC 115. Laboratory Biology I. 1 sem. hr.**  
Prerequisite(s): BSC 114  
Prerequisite(s) with concurrency: BSC 114.

**BSC 116. Principles Biology II. 3 sem. hrs.**  
For biology majors, biology minors, and pre-health professions students. Study of the structure, function, and ecology of organisms, including bryophytes, vascular plants, invertebrate animals, and vertebrate animals. Offered fall, spring, and summer. NOTE: A student must take both BSC 116 and BSC 117 in order to use either one of the courses to satisfy a portion of the natural science (N) requirement of the University Core Curriculum.

**BSC 117. Biology II Laboratory. 1 sem. hr.**  
Prerequisite(s) with concurrency: BSC 116.

**BSC 118. Honors General Biology I. 4 sem. hrs.**  
Lecture, discussion period, and laboratory. Thorough study of general biological principles, including the chemical basis of life, cellular biology, genetics, evolution, and a survey of prokaryotic organisms.  
Prerequisite(s): Honors attribute or ACT score of 28 or above.

**BSC 120. Honors Gen Biology II. 4 sem. hrs.**  
Lecture, discussion period, and laboratory. Thorough study of the structure, function, physiology, and ecology of organisms, including higher and lower plants and invertebrates and vertebrates.  
Prerequisite(s): BSC 114 and BSC 115 or BSC 118.

**BSC 215. Human Anatomy & Physiology I. 4 sem. hrs.**  
Lecture, laboratory, and laboratory lecture. Integrated survey of human anatomy and physiology that includes cellular aspects; tissues and skin; the skeletal, muscular, nervous and endocrine systems; and the special senses of sight, hearing, taste, and smell.  
Prerequisite(s): BSC 108 or BSC 109 or BSC 118 or BSC 120 or BSC 114 and BSC 115; or BSC 116 and BSC 117; or CH 102 or CH 105 or CH 118.

**BSC 216. Human Anatomy & Physiology II. 4 sem. hrs.**  
Lecture, laboratory, and laboratory lecture. Integrated survey of human anatomy and physiology that includes the respiratory, circulatory, digestive, urinary, and reproductive systems.  
Prerequisite(s): BSC 215.

**BSC 220. Biol Evol. 3 sem. hrs.**  
An introductory course on the evidence for evolution, mechanisms of evolutionary change, natural and sexual speciation, and common misconceptions about evolution.

**BSC 242. Microbiology And Man. 4 sem. hrs.**  
For students majoring in nursing, education, and human environmental sciences. Lecture and laboratory. Introduction to microbiology with an emphasis on the relationships between man and protozoa, bacteria, viruses, and fungi. NOTE: Credit will not be granted for both BSC 242 and BSC 310.  
Prerequisite(s): CH 101 or CH 104 or CH 117; and CH 102 or CH 105 or CH 118; and BSC 108 or BSC 109 or BSC 114 or BSC 118 or BSC 215 or BSC 216.

**BSC 300. Cell Biology. 3 sem. hrs.**  
The course is designed to provide an understanding of the molecular basis of cell function. Topics include metabolism, gene control, cell membranes, and cell-to-cell signaling.  
Prerequisite(s): BSC 114 or BSC 118; and CH 102 or CH 118.

**BSC 303. Field Zoology. 3 sem. hrs.**  
A field-based course with lecture and lab combined. A survey of the taxonomy, ecology, and identification of local biota. Offered irregularly.  
Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120.

**BSC 310. Microbiology. 3 sem. hrs.**  
Lecture. Survey course on microorganisms, including protozoa, bacteria, viruses, fungi, and algae. Credit will not be granted for both BSC 310 and BSC 242.  
Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120  
Prerequisite(s) with concurrency: CH 231.

**BSC 311. Gen Bacteriol & Physiol. 3 sem. hrs.**  
Fundamental course in bacteriology with emphasis on bacterial morphology, physiology, nutrition, and genetics.  
Prerequisite(s): BSC 310 and CH 232.

**BSC 312. Microbiology Lab. 2 sem. hrs.**  
General microbiology laboratory to accompany BSC 310.  
Prerequisite(s): BSC 310  
Prerequisite(s) with concurrency: BSC 310.

**BSC 313. Gen Bacteriology Lab. 3 sem. hrs.**  
Lecture and laboratory. Course presents methods for the isolation, microscopic observation, enumeration, and determination of the biochemical characteristics of bacteria.  
Prerequisite(s): BSC 310 and BSC 115 or BSC 116 and BSC 117 or BSC 120 or permission of the instructor.

**BSC 315. Genetics. 3 sem. hrs.**  
Study of transmission and function of genes, gene organization, regulation of prokaryotic and eukaryotic genes, and applications of genetics.  
Prerequisite(s): BSC 114 or BSC 118; and CH 101 or CH 117; and CH 102 or CH 118.

**BSC 320. Freshwater Studies. 4 sem. hrs.**  
Lecture and laboratory. Introduction to freshwater natural history and ecology with specific emphasis on the common freshwater habitats of Alabama.  
Prerequisite(s): BSC 114; and BSC 115 or BSC 116; and BSC 117 or BSC 120.

**BSC 325. Tropical Plant Diversity. 4 sem. hrs.**  
The purpose of this course is to familiarize students with the relevant aspects of tropical ecosystems and tropical plants.  
Prerequisite(s): BSC 114 or BSC 118; and BSC 115; and BSC 116 or BSC 120; and BSC 117.

**BSC 340. Principles of Natural Resources Conservation. 3 sem. hrs.**  
Introduces students to basic principles of natural resources conservation, including fundamental concepts in natural resource conservation and management. Examines humanity’s past and present impacts on world environments; the influence of culture and the wants, needs, and desires of human beings will be integrated into the material. Discusses conservation of natural resources, including soil, water, air, forests, rangelands, energy, wildlife and fisheries, based on scientific principles.  
Prerequisite(s): (BSC 114 and BSC 115 or BSC 118) OR (BSC 116 and BSC 117 or BSC 120).

**BSC 360. Plant Biology. 4 sem. hrs.**  
Lecture and laboratory. Introduction to the biology of embryophytes with emphasis on their development, evolution, and ecology.  
Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120.

**BSC 373. Vertebrate Zoology. 4 sem. hrs.**  
Lecture and laboratory. Introductory course in the study of vertebrate zoology. Subjects included are principles of systematics and nomenclature, a survey of vertebrate taxa, the species concept, analysis of taxonomic characters, and an introduction to zoogeography and behavior.  
Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120.

**BSC 376. Invertebrate Zoology. 4 sem. hrs.**  
Lecture and laboratory. The classification, morphology, evolution, and ecology of invertebrate animals.  
Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120.
BSC 380. Introduction to probability and statistics for biologists. 3 sem. hrs.
This course will provide an introduction to probability and statistical methods that are commonly used in the biological sciences. Practical, real-world examples from biology, ecology, and natural resources management will be used throughout the course. This course is aimed at 300-level students who intend to work with biological data, or anyone interested in statistics. Computing proficiency is required for a passing grade in this course.
Prerequisite(s): MATH 112 or MATH 115 or MATH 125 or MATH 145 and CS 102.

BSC 385. Ecology and Evolution. 3 sem. hrs.
This course introduces the student to two fundamental disciplines in biology – ecology and evolution. We introduce the student to the processes common to both disciplines and show how these have shaped the diversity and organization of life on this planet.
Prerequisite(s): MATH 112 or MATH 115 or MATH 121 or MATH 125 or MATH 145; and BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120.

BSC 386. General Ecology Lab. 2 sem. hrs.
Offered irregularly.
Prerequisite(s): BSC 385
Prerequisite(s) with concurrency: BSC 385.

BSC 390. Honors Thesis Research. 1-8 sem. hr.
Individual research conducted under the direction of an advisor and reported in an acceptable thesis. May be repeated over two to four semesters for a maximum 8 hours.
Prerequisite(s): BSC 315 and BSC 300 and BSC 385.

BSC 391. Tutorial in Biology. 1-2 sem. hr.
Survey of the literature relating to a topic approved by the supervising faculty member; not to include laboratory or field research. A formal paper and/or examination is required. May be taken for one credit hour in each of two consecutive semesters, or for one or two credit hours in any one semester. Offered according to demand.
Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120.

BSC 392. Biology Outreach. 2 sem. hrs.
Outreach course that includes survey of the literature relating to a topic approved by instructor. Design of active learning projects to emphasize a basic biological concept and teaching basic science concepts to elementary students. A maximum of 4 hours credit may be applied to the requirements for the biology or microbiology major.
Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120.

BSC 394. Honors Intro To Bsc Instruction. 2 sem. hrs.
Prerequisites: BSC 114:115 or BSC 118; BSC 116:117 or BSC 120, and junior or senior standing. Honors attribute, formal application, and a satisfactory interview.
Prerequisite(s): BSC 114 and BSC 115; or BSC 118; and BSC 116 and BSC 117; or BSC 120.

BSC 407. Honors Seminar in Bsc. 1 sem. hr.
Seminar and discussion. In the first semester, students present seminars based on the current literature. In the second semester, students present seminars derived from their honors theses. A maximum of 2 hours of credit for BSC 407 may be applied to the requirements of the biology or microbiology major. Offered according to demand.

BSC 409. Pre-Health Apprenticeship I. 2 sem. hrs.
This course provides a one semester apprenticeship at a local health care facility and is intended for all pre-health professional students. This course also has a service learning component. It does not count as applicable hours for the biology major or minor.

BSC 410. Pre-Health Apprenticeship II. 2 sem. hrs.
This course provides a one semester apprenticeship at a local health care facility and is intended for all pre-health professional students. This course also has a service learning component. It does not count as applicable hours for the biology major or minor.

BSC 411. Limnology. 3 sem. hrs.
Study of freshwater environments and the organisms that live in lakes, ponds, and streams. May be taken with BSC 413 or separately.
Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120.

BSC 415. Wetland Ecology. 3 sem. hrs.
An in-depth analysis of wetland ecology emphasizing the biology and ecology of vascular plants, including plant adaptations to anaerobic soils, reproductive adaptations, habitat, and plant zonation, and the role of plants in ecosystem function. Offered in alternate years.
Prerequisite(s): BSC 385.

BSC 417. Environmental Modeling. 3 sem. hrs.
An integrated study of quantitative principles and computer-based solution techniques important for understanding environmental systems and for environmental problem solving.
Prerequisite(s): MATH 125 and CH 101 or CH 117; and CH 102 or CH 118 and BSC 365.

BSC 420. Principles of Systematics. 4 sem. hrs.
Introduction to the principles, methods, and applications of systematics to analysis of morphological and molecular data. Includes introduction to biological classifications and nomenclature.
Prerequisite(s): BSC 360 or BSC 373 or BSC 376 or BSC 483.

BSC 421. Personalized and Genetic Medicine. 3 sem. hrs.
This course will examine biological techniques that are advancing medical research and care. Topics include personalized medicine, direct-to-consumer genetic testing, predictive medicine, pharmacogenomics, and preimplantation genetic diagnosis. It will also explore concomitant ethical, legal, and societal ramifications related to many of these discoveries, such as ownership of biological material, informed consent for human experimentation, the burden of knowledge regarding genetic information, eugenics, and the Genetic Information Non-Discrimination Act.
Prerequisite(s): BSC 300 and BSC 315.

BSC 422. Biology of Cancer. 3 sem. hrs.
This course is an introduction to the biological principals that explain the origins, development, pathology, and treatment of cancer. Students will work in teams assigned to particular types of cancer and will investigate what is known on various topics as related to that type of cancer.
Prerequisite(s): BSC 300 minimum grade of C- and BSC 315 minimum grade of C-.

BSC 424. Human Physiology. 3 sem. hrs.
Topics covered are the digestive, nervous, reproductive, immune, muscular, blood, cardiovascular, respiratory, urinary, and body-fluid systems. May be taken with BSC 425 or separately.
Prerequisite(s): BSC 300.

BSC 425. Human Physiology Lab. 2 sem. hrs.
Hands-on experience for understanding the principles and mechanisms of physiological processes of the human body. Major emphases on organ system performance, whole-body metabolism, and energetics.
Prerequisite(s): BSC 424
Prerequisite(s) with concurrency: BSC 424.

BSC 482. Biology Of Fishes. 4 sem. hrs.
Lecture and laboratory. Survey of the structure, function, ecology, and classification of fishes. Offered in alternate years.
Prerequisite(s): BSC 385.
BSC 431. Pathogenic Microbiology. 3 sem. hrs.
Study of microorganisms related to health and disease with emphasis on molecular mechanism of pathogenesis. Offered in alternate years.
Prerequisite(s): BSC 310.

BSC 432. Pathogenic Micobiol Lab. 3 sem. hrs.
Practical experience in the isolation, characterization, and identification of pathogenic microorganisms. Offered in alternate years.
Prerequisite(s): BSC 312
Prerequisite(s) with concurrency: BSC 431.

BSC 434. Plant Systematics. 4 sem. hrs.
Lecture and laboratory. Characteristics and distribution of the major families of vascular plants as well as practice in the collection and identification of flowering plants. One weekend field trip required. Offered in alternate years.
Prerequisite(s): BSC 360.

BSC 435. Immunology. 4 sem. hrs.
Thorough exploration of various aspects of modern immunology at the molecular and cellular levels.
Prerequisite(s): BSC 310.

BSC 436. Immunology Laboratory. 3 sem. hrs.
Practical experience in modern immunological techniques. Offered in alternate years.
Prerequisite(s): BSC 435

BSC 439. Bch/Molecular Biology Lab. 3 sem. hrs.
Students participate in the generation of new knowledge, thus the experiments vary. Techniques taught include agarose gel electrophoresis, cycle sequencing, sequence analysis, plasmid purification, restriction endonuclease digestion, gel purification of DNA, ligation, transformation, primer design, PCR, gene knockouts, protein fusions, and enzyme assays.
Prerequisite(s): BSC 450.

BSC 441. Developmental Biology. 3 sem. hrs.
The course provides basic information about events in developing animal systems, emphasizing cellular, molecular, and genetic research approaches to the study of development.
Prerequisite(s): BSC 300 and BSC 315.

BSC 442. Integrated Genomics. 4 sem. hrs.
An advanced discovery-based laboratory course designed to introduce the process of gene discovery and integrate modern genomics techniques and bioinformatic database usage.
Prerequisite(s): BSC 300 and BSC 315
Prerequisite(s) with concurrency: BSC 315.

BSC 444. General Virology. 3 sem. hrs.
A survey of viruses, viral replication, and viral pathogenesis, including bacterial, animal, and plant viruses. The role of viruses in molecular biology is emphasized.
Prerequisite(s): BSC 300 or BSC 310.

BSC 448. Animal Behavior. 3 sem. hrs.
This course is designed to provide modern perspectives on the study of animal behavior, pulling from fields as diverse as evolutionary biology, ecology, neurobiology and economics. However there will be a historical undercurrent which will illustrate the roots of this truly interdisciplinary field.
Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120; and BSC 385.

BSC 449. Endocrinology. 3 sem. hrs.
A detailed examination of the vertebrate endocrine system that uses a comparative approach to explore intricate relationships between the brain, endocrine glands, hormon targets and target organs.
Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120; and BSC 300.

BSC 450. Fundamentals of Biochemistry. 3 sem. hrs.
Prerequisite(s): BSC 300 minimum grade of C- and CH 232 minimum grade of C-

BSC 451. Molecular Biology. 3 sem. hrs.
A one-semester survey of molecular biology that emphasizes gene structure, function, and regulation of expression. Offered spring semester.
Prerequisite(s): BSC 311 or BSC 315; and BSC 450; and CH 462 or.

BSC 456. Microbial Ecology. 3 sem. hrs.
Study of microorganisms in the environment, with emphasis on their roles in energy transformations, biogeochemical cycles, and biotic interactions.
Prerequisite(s): BSC 310 or BSC 385.
BSC 485. Foundations in Forest Resources and Conservation. 3 sem. hrs.
This course provides an introduction to the foundational ideas of forest resources and conservation. The course includes a history of the forestry profession and a variety of perspectives to develop students’ knowledge of forestry field and research methods. This course also helps students develop an understanding and appreciation of the diversity of forest resources both here in Alabama and globally. Prerequisite(s): (BSC 114 minimum grade of C- or BSC 118 minimum grade of C-) and (BSC 116 minimum grade of C- or BSC 120 minimum grade of C-) and BSC 340 minimum grade of C-.

BSC 487. Biogeography. 3 sem. hrs.
Examination of the ecological and historical factors influencing the geographic distribution of plants and animals. Offered alternate years. Prerequisite(s): BSC 385.

GEO 210. Mineralogy. 4 sem. hrs.
Lecture and laboratory. Study of the taxonomy and morphology of major rock-forming minerals, physical properties of minerals, hand sample mineral identification, and optical mineralogy. Offered in alternate years. Prerequisite(s): BSC 300 minimum grade of C- and BSC 315 minimum grade of C- and BSC 450 minimum grade of C-.

BSC 497. Special Topics. 1-4 sem. hr.
A biological sciences topic not covered in other courses. The credit hours and format are determined as appropriate to the topic, and a course title is added to the schedule of classes. Offered according to demand. Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120.

Geological Sciences (GEO) Courses

GEO 101. The Dynamic Earth. 4 sem. hrs.
Three lectures and one laboratory. Study of the earth including materials, internal and external processes, defomational events, and plate tectonics. Offered in the fall, spring, and summer semesters.

GEO 102. The Earth Through Time. 4 sem. hrs.
Three lectures and one laboratory. Survey of earth’s history including origin of the earth, plate tectonics and evolution of the continents and ocean basins, and the development of life. Offered in the fall, spring, and summer semesters.

GEO 104. Hazardous Earth. 4 sem. hrs.
This natural science course examines geologic and other Earth hazards that impact humans and ways that human activities often increase these hazards. The course consists of lecture and lab, and includes field trips and videos that illustrate various natural hazards.

GEO 105. Sustainable Earth. 4 sem. hrs.
Three lectures and one laboratory. Lecture and laboratory provide an understanding of important earth resources (rocks and minerals, soil, water, fossil fuels, alternative energy) and how their utilization by humans impacts the environment. Includes discussion of water pollution, air pollution and waste disposal as primary issues related to resource utilization.

GEO 210. Mineralogy. 4 sem. hrs.
Two lectures and two laboratories. Introduction to crystallography, crystal chemistry, rock-forming minerals, physical properties of minerals, hand sample mineral identification, and optical mineralogy. Offered in the fall semester. Prerequisite(s): CH 101 and GEO 101.

GEO 306. Hydrogeology. 3 sem. hrs.
Introduction to the principles of groundwater flow, groundwater exploration, water quality, and groundwater contamination; environmental topics in groundwater. Offered in the fall semester. Prerequisite(s): GEO 101.

Three lectures and one laboratory. Megascopic and microscopic study of igneous and metamorphic rocks, with emphasis on identification, classification, genesis, and relationships to tectonism. Offered in the spring semester. Prerequisite(s): GEO 210.

GEO 355. Invertebrate Paleontology. 3 sem. hrs.
Two lectures and one laboratory. Study of the taxonomy and morphology of major invertebrate fossil groups. Offered in the spring semester. Prerequisite(s): GEO 101 and GEO 102.

GEO 363. Geomorphology. 3 sem. hrs.
Two lectures and one laboratory. Study of landforms with emphasis on the basic geomorphic processes that contribute to their origin. Offered in the fall semester. Prerequisite(s): GEO 101.

GEO 365. Structural Geology. 3 sem. hrs.
Two lectures and one laboratory. An introductory study of the deformation of rocks, including mechanical principles, description and identification of folds and faults, map interpretation, and regional tectonics. Offered in the fall semester. Prerequisite(s): GEO 101 and PH 101.

GEO 367. Sedimentology/Stratigraphy. 4 sem. hrs.
Three lectures and one laboratory. Study of the principles involved in the description and classification of sedimentary rocks and stratigraphic units, with emphasis on sedimentary processes and depositional environments. Offered in the spring semester. Prerequisite(s): GEO 102 and GEO 210.

GEO 369. Introduction Geophysics. 3 sem. hrs.
Introduction to the major fields of exploration geophysics such as seismology, isostasy, heat flow, gravity and magnetic prospecting, and electrical methods. The course includes both principles and applications to petroleum, mining, and environmental problems. Offered in the fall semester. Prerequisite(s): MATH 125 and PH 101 and GEO 101.

GEO 398. Undergraduate Research. 1-6 sem. hr.
A maximum of 4 hours can be applied toward the major in geology. Approval of the department chairperson is required prior to registration. Offered according to demand. Prerequisite(s): GEO 101 or GEO 102.

GEO 404. Quaternary Climate and Envrmnt. 3 sem. hrs.
Outline of the climatological and environmental history of the past two million years, focusing on causes and impact of glacial and shorter oscillations. Offered according to demand. Prerequisite(s): GEO 401.

GEO 407. Seismology. 3 sem. hrs.
This course provides an overview of earthquake seismology for both upper-level and graduate geo-science students. Topics include elastic wave propagation, seismic ray theory, travel time interpretations, surface wave dispersion, and seismic tomography. Prerequisite(s): MATH 126 or MATH 146.

GEO 410. Soil & Groundwater Restoration. 3 sem. hrs.
Methods for restoring contaminated soil groundwater by examining the factors and processes influencing the efficacy of remediation systems. Emphasis placed on the scientific principles upon which soil and groundwater remediation is based. Prerequisite(s): GEO 101 and CH 101 or CH 117 and CH 102 or 118.

GEO 411. Contaminant Transport in Porous Media. 3 sem. hrs.
This course will cover topics related to the transport and fate of contaminants in subsurface systems. Specifically, this course will discuss the many factors and processes influencing contaminant transport such as the effects of dispersion, inter-phase mass transfer, transformation reactions, and porous-media heterogeneity. In addition, representative conceptual/mathematical models describing contaminant transport phenomena will be discussed. Prerequisite(s): MATH 125 PH 102 CH 102 GEO 306.

GEO 416. Volcanology. 3 sem. hrs.
Study of the physical properties of magmas, eruptive mechanisms, volcanic products, and the relationship between volcanism and tectonism. Writing proficiency within this discipline is required for a passing grade in this course. Offered in the fall semester. Prerequisite(s): GEO 101 The Dynamic Earth GEO 314 Ign. & Meta. Petrology.

GEO 420. Petroleum Geology. 3 sem. hrs.
Introduction to the origin, migration, accumulation, and entrapment of petroleum. Emphasis is on sedimentary, geochemical, and hydrodynamic processes. Offered in the spring semester of even-numbered years. Prerequisite(s): GEO 365 and GEO 367.

GEO 421. Geology & History of W Turkey. 3 sem. hrs.
This two week long course will emphasize environmental geology history, geoaquaculture, and natural hazards of the Greco-Roman city states in Western Anatolia. It will concentrate on the effects of geology and natural hazards in the decline and eventual fall of these large city states and cultural centers.

GEO 424. Topics In Geology. 1-4 sem. hr.
Special topics in the following areas: economic geology, geochemistry, geophysics, geomorphology, hydrogeology, mineralogy, paleontology, petrology, sedimentology, stratigraphy, structural geology, and tectonics. Offered according to demand. Prerequisite(s): GEO 101 The Dynamic Earth / Minimum Grade of C-. 
GEO 430. Ore Deposits. 3 sem. hrs.
Introduction to sedimentary hydrothermal, metasomatic, and magnetic ore deposits, including geologic setting and genesis. Offered on demand. Prerequisite(s): GEO 210.

GEO 435. Honors Sem In Geology. 1 sem. hr.
Oral presentations on current geological topics. Offered in the fall semester.

GEO 436. Honors Sem In Geology. 1 sem. hr.
Oral presentations on current geological topics. Offered in the spring semester.

Introduction to multichannel seismic data acquisition, processing, and interpretation. Includes the theory of wave propagation, time series analysis, and filtering. Lab is problem-based using real-world data and examples. Offered according to demand. Prerequisite(s): MATH 125 or MATH 145; and PH 162.

GEO 446. Scientific Computing. 3 sem. hrs.
This course covers a broad range of computational methods used in the geosciences. Topics include data analysis, manipulation and image processing, using a variety of software packages. Offered according to demand.

GEO 470. General Geochemistry. 3 sem. hrs.
Overview of the field of geochemistry (elementary chemical equilibria and thermodynamics, organic geochemistry, isotope geochemistry), with an emphasis on solving geologic problems. Offered in the Spring semester. Prerequisite(s): GEO 314.

GEO 476. Analytical Geochemistry. 3 sem. hrs.
Theory, techniques, and applications of geochemical methods for the analysis of rocks, soils, and aqueous fluids. Offered according to demand.

GEO 490. Seminar Regional Geology. 1-3 sem. hr.
Seminar on and field trip to important geologic localities. May be repeated for credit. Offered according to demand.

GEO 492. Geologc Field Writg Tech. 2 sem. hrs.
Introduction to the methods of field geology, geology of the southeastern U.S., geological writing, and presentation techniques. Offered according to demand. Prerequisite(s): GEO 367.

GEO 495. Field Geology. 6 sem. hrs.
Five-week field course involving the application of geologic techniques and principles. Includes geologic mapping, data collection, and report writing. Offered during the first summer term. Prerequisite(s): GEO 314 and GEO 365 and GEO 367.

GEO 497. Geological Internships. 3 sem. hrs.
A maximum of 4 hours can be applied toward the major in Geology. Field and laboratory projects with government and industry. Offered according to demand. Prerequisite(s): GEO 101 and GEO 102 or GEO 105.

GEO 499. Research In Geology. 1-4 sem. hr.
Offered according to demand.

Marine Science (MS) Courses

MS 304. Marine Geology. 4 sem. hrs.
Credit earned in this course may not be applied to the requirements of the biological sciences major or minor. Field sampling techniques, laboratory analysis of sediments, topography, sediments, and history of the world oceans.

MS 306. Marine Biology. 4 sem. hrs.
Survey of the invertebrates, vertebrates, and marine plants as communities, with emphasis on local examples.

MS 321. . 2 sem. hrs.
This course is an introductory level course to coastal avian fauna. Study of coastal birds with an emphasis on various nesting sites and nesting behavior. This course includes identification, population dynamics and behavior of coastal birds. Lectures emphasize functional ecology specifically nesting biology of numerous species found along Alabama’s coastal region. Topics include migration, mechanics of flight, breeding biology, and foraging. This course is a field-based course with an emphasis on breeding biology and behavior and introduction to bird identification. Prerequisite(s): BSC 114 or BSC 385.

MS 400. . 2 sem. hrs.
This course is an introduction to coastal sediment processes and applied coastal geomorphology. Waves and other coastal hydrodynamics, sediment transport, and interaction between natural process and man’s activities such as dredging, jetties, and beachfills will be studied. The barrier island coast of Alabama will be used extensively in field trip investigations of these processes. This course is designed for undergraduate and graduate students in the physical and biological marine sciences. Prerequisite(s): BSC 114 or GEO 101.

MS 408. Marine Invertebrate Zoology. 4 sem. hrs.
Comparative study of the major marine invertebrate phyla, protozoa through protochordates. The focus is on their morphology, physiology, ecology, and phylogenetic relationships.

MS 419. Marine Ecology. 4 sem. hrs.
Bioenergetics, community structure, population dynamics, predation, competition, and specialization in marine ecosystems.

MS 433. Coastal Zone Management. 2 sem. hrs.
Review of ecological features, physical management policies for coastal communities, and a description of relevant federal and state programs.

A general introduction to the oceans, with emphasis on chemical, physical, and geological processes and their relation to biological systems.

MS 452. Marine Vertebrate Zoology. 4 sem. hrs.
Systematics, zoogeography, and ecology of marine vertebrates.

MS 453. Marine Botany. 4 sem. hrs.
Reproduction, taxonomy, systematics, distribution, and ecology of the major marine plant groups.

MS 497. Special Topics. 1-4 sem. hr.
A marine science topic not covered in other courses. The credit hours and format are determined as appropriate to the topic. Offered according to demand and instructor availability.