BACHELOR OF SCIENCE WITH A MAJOR IN ENVIRONMENTAL AND SUSTAINABILITY SCIENCE

REQUIREMENTS

The following requirements must be fulfilled:

The general requirements stated under Columbian College of Arts and Sciences, Undergraduate Programs.

The program-specific curriculum:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Foundational courses</strong></td>
<td></td>
</tr>
<tr>
<td>BISC 1111</td>
<td>Introductory Biology: Cells and Molecules</td>
<td></td>
</tr>
<tr>
<td>BISC 1112</td>
<td>Introductory Biology: The Biology of Organisms</td>
<td></td>
</tr>
<tr>
<td>GEOG 1002</td>
<td>Introduction to Physical Geography</td>
<td></td>
</tr>
<tr>
<td>or GEOL 1005</td>
<td>Environmental Geology</td>
<td></td>
</tr>
<tr>
<td>GEOG 1003</td>
<td>Society and Environment</td>
<td></td>
</tr>
<tr>
<td>or SUST 1001</td>
<td>Introduction to Sustainability</td>
<td></td>
</tr>
<tr>
<td>STAT 1051</td>
<td>Introduction to Business and Economic Statistics</td>
<td></td>
</tr>
<tr>
<td>or STAT 1053</td>
<td>Introduction to Statistics in Social Science</td>
<td></td>
</tr>
<tr>
<td>or STAT 1111</td>
<td>Business and Economic Statistics I</td>
<td></td>
</tr>
<tr>
<td>or STAT 1127</td>
<td>Statistics for the Biological Sciences</td>
<td></td>
</tr>
</tbody>
</table>

Two of the following course sets:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1111 &amp; CHEM 1112</td>
<td>General Chemistry I and General Chemistry II</td>
<td></td>
</tr>
<tr>
<td>MATH 1220 &amp; MATH 1221</td>
<td>Calculus with Precalculus I and Calculus with Precalculus II</td>
<td></td>
</tr>
<tr>
<td>or MATH 1231</td>
<td>Single-Variable Calculus I</td>
<td></td>
</tr>
<tr>
<td>PHYS 1011 &amp; PHYS 1012</td>
<td>General Physics I and General Physics II</td>
<td></td>
</tr>
<tr>
<td>or PHYS 1021 &amp; PHYS 1022</td>
<td>University Physics I and University Physics II</td>
<td></td>
</tr>
<tr>
<td>or PHYS 1025 &amp; PHYS 1026</td>
<td>University Physics I with Biological Applications</td>
<td></td>
</tr>
<tr>
<td>&amp; PHYS 1026</td>
<td>University Physics II with Biological Applications</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 2104</td>
<td>Introduction to Cartography and GIS</td>
<td></td>
</tr>
<tr>
<td>GEOG 2196</td>
<td>Field Methods in Geography</td>
<td></td>
</tr>
<tr>
<td>or GEOG 3128</td>
<td>Geomorphology and Natural Hazards</td>
<td></td>
</tr>
<tr>
<td>or BISC 3459</td>
<td>Field Biology</td>
<td></td>
</tr>
<tr>
<td>ENVR 4195</td>
<td>Environmental Studies Capstone</td>
<td></td>
</tr>
</tbody>
</table>

Upper-level major requirements

Required courses

- GEOG 2104 Introduction to Cartography and GIS
- GEOG 2196 Field Methods in Geography
- or GEOG 3128 Geomorphology and Natural Hazards
- or BISC 3459 Field Biology
- ENVR 4195 Environmental Studies Capstone

Additional upper-level course requirements

18 credits in courses in the major taken at or above the 2000 level. A minimum of 12 of these credits should be within one of the two concentrations below and include at least one 3000-level course. The remaining two courses can be selected from the other concentration or from the “other upper level courses in the major” category below.

- Earth and environmental science concentration
  - CHEM 2085 Environmental Chemistry
  - CHEM 3140 Geochemistry
  - GEOG 2136 Water Resources
  - GEOG 3105 Techniques of Spatial Analysis
  - GEOG 3108 Weather and Climate
  - GEOG 3128 Geomorphology and Natural Hazards
  - GEOG 3218 Arctic Systems
  - GEOL 2106 Oceanography
  - GEOL 2151 Introduction to Paleontology
  - GEOL 3138 Hydrogeology
  - GEOL 3191 Geology of Energy Resources

- Ecological management concentration
  - BISC 2010 Global Change Biology
  - BISC 2401 Biodiversity in A Changing World
  - BISC 2454 General Ecology
  - BISC 3454 Marine Ecology
  - BISC 3459 Field Biology
  - BISC 3460W Conservation Biology
or BISC 3460 Conservation Biology
BISC 3461 Plant-Animal Interactions
BISC 3464 Ecology and Evolution of Societies
GEOG 2129W Biogeography
or GEOG 2129 Biogeography
GEOG 3132 Environmental Quality and Management

Other upper-level courses in the major **
ECON 2136 Environmental and Natural Resource Economics
GEOG 3105 Techniques of Spatial Analysis
GEOG 3106 Intermediate Geographic Information Systems
GEOG 3107 Introduction to Remote Sensing
GEOG 3193 Environmental Law and Policy
GEOG 4309 GIS for Emergency Management
PHIL 2281 Philosophy of the Environment
PPPA 2701 Sustainability and Environmental Policy
PUBH 3132 Health and Environment

* BISC 3459 and GEOG 3128 cannot be double counted as concentration courses if already used to fulfill the upper-level major requirement.

** May be used to fulfill the total number of required credits in the major.

GENERAL EDUCATION

In addition to the University General Education Requirement (http://bulletin.gwu.edu/university-regulations/general-education/#text), undergraduate students in Columbian College must complete a further, College-specific general education curriculum—Perspective, Analysis, Communication, or G-PAC (http://bulletin.gwu.edu/arts-sciences/gpac/). Together with the University General Education Requirement, G-PAC engages students in active intellectual inquiry across the liberal arts. Students achieve a set of learning outcomes that enhance their analytical skills, develop their communication competencies, and invite them to participate as responsible citizens who are attentive to issues of culture, diversity, and privilege.

G-PAC approved courses, Dean’s Seminars, and Sophomore Colloquia that may be available for registration are listed on the CCAS Advising website (https://advising.columbian.gwu.edu/general-education-courses/).

Coursework for the University General Education Requirement is distributed as follows:

- Writing—one approved course in university writing and two approved writing in the disciplines (WID) courses.
- Humanities—one approved course in the humanities that involves critical or creative thinking skills.
- Mathematics or Statistics—one approved course in either mathematics or statistics.
- Natural or Physical Science—one approved laboratory course that employs the process of scientific inquiry.
- Social Sciences—two approved courses in the social sciences.

Coursework for the Columbian College general education curriculum is distributed as follows:

- Arts—one approved course in the arts that involves the study or creation of artwork based on an understanding or interpretation of artistic traditions or knowledge of art in a contemporary context.
- Global or Cross-Cultural Perspective—one approved course that analyzes the ways in which institutions, practices, and problems transcend national and regional boundaries.
- Humanities—one approved course in the humanities that involves critical thinking skills (in addition to the one course in this category required by the University General Education Requirement).
- Local or Civic Engagement—one approved course that develops the values, ethics, disciplines, and commitment to pursue responsible public action.
- Natural or Physical Science—one approved laboratory course that employs the process of scientific inquiry (in addition to the one course in this category required by the University General Education Requirement).
- Oral Communication—one course in oral communication.

Certain courses are approved to fulfill the requirement in more than one of these categories.

Courses taken in fulfillment of G-PAC also may be counted toward majors or minors. Transfer courses taken prior to, but not after, admission to George Washington University may count toward the University General Education Requirement and G-PAC, if those transfer courses are equivalent to GW courses that have been approved by the University and the College.