

Environmental Science

(Bachelor of Science)

The Environmental Science major prepares students to analyze, understand, and solve environmental problems. While many universities are just beginning to recognize the need for environmental science programs, UW-Green Bay has over 50 years of teaching and research experience in the field. This Environmental Science program was one of the first in the nation and the interdisciplinary focus allows students to have a diverse education.

The Environmental Science major is interdisciplinary, emphasizing an integrated approach to knowledge in the field. Because the study of environmental problems requires a sound understanding of scientific principles, the Environmental Science major is grounded in the natural sciences and mathematics. The curriculum also includes a social science component, enabling students to gain an understanding of environmental economic and policy issues. Field experiences, internships, practicums, independent research and travel courses are also emphasized throughout the program.

This major helps students: 1) understand fundamental physical and biological processes of the natural environment; 2) recognize relationships between humans and ecosystems at local, regional, and global scales; 3) apply knowledge from multiple disciplines to environmental challenges and opportunities; 4) build practical skills for scientific problem-solving, including familiarity with laboratory and field instrumentation, ability to use current computer technologies, and experience in statistical modeling techniques; 5) demonstrate competency in collecting, managing, evaluating, interpreting, and communicating information through hands-on research; and 6) critically evaluate strategies for sustainable management and restoration of environmental systems.

Students who plan to pursue this major will apply science and mathematics in their course work. Courses in biology, chemistry, geoscience, mathematics, and physics provide the needed background. They receive hands-on and practical learning experiences in both the laboratory and the field. A significant number of graduates of this major gain entry-level positions in the environmental science field. About one-third of these positions are in the public sector and two-thirds are in the private sector, including positions with industry, business, and engineering consulting firms. Numerous graduates have also successfully completed master's and doctoral degrees.

Faculty members are actively addressing current environmental problems and their solutions through research at the regional, national and international levels. This research keeps them up to date on current trends and topics in the field, while providing opportunities for undergraduates to become involved in their research projects and gain valuable knowledge and experience. Faculty members are highly involved in the students' education, both inside and outside of the classroom and laboratories.

Environmental Science students have access to modern computer facilities which are continually upgraded. Computing software resources emphasizing geographic information systems (GIS), mathematical modeling and statistical analysis tools also are available. In addition to general-access computer laboratories, students can also use a computer laboratory dedicated to the sciences. Students wishing to gain hands-on field experiences have access to the Cofrin Center for Biodiversity, which includes the 290-acre Cofrin Memorial Arboretum on campus and several natural areas in the region including Point au Sable, Tofts Point and Kingfisher Farms. The Gary A. Fewless Herbarium, and the Richter Museum of Natural History on campus include extensive collections of plant and animal specimens. Funding opportunities are also available through the Biodiversity Center for independent student research projects.

A variety of equipment is available for environmental measurements and monitoring. Laboratory instrumentation enhances student opportunities to perform chemical analyses which are important in environmental monitoring. Such instrumentation includes mass spectrometers, infrared and UV-visible spectrophotometers, nuclear magnetic resonance spectrometers, gas chromatographs, ion chromatographs, and high-performance liquid chromatographs. In addition to opportunities to monitor air and surface-water quality, students also have the opportunity to monitor ground water; three wells have been drilled on campus specifically for that purpose.

As industries recognize their responsibility to help create and maintain a sustainable environment, often achieving efficiencies in the process, they create positions dealing with waste management, pollution reduction, and other environmental responsibilities. Many UW-Green Bay Environmental Science graduates find employment in these industries or go on to advanced study in environmental science or other scientific disciplines. The following list represents some careers that have been pursued by Environmental Science graduates: agricultural scientist, botanist, ecologist, forest ranger, oceanographer, agricultural technician, engineering technician, forester, air and water quality manager, environmental analyst, park ranger, air pollution analyst, environmental consultant, environmental educator, geologist, project manager, environmental engineer, geophysicist, biologist, hazardous waste manager, hydrologist, environmental lawyer, chemical technician, soil conservation technician, chemist, management consultant, teacher, meteorologist, urban and regional planner, civil engineer, environmental planner, microbiologist/wastewater plant operator, natural resource specialist, wildlife manager, conservationist, zoologist.

Students may study abroad or at other campuses in the United States through UW-Green Bay's participation in international exchange programs and National Student Exchange. Travel courses are another option for obtaining academic credits and completing requirements. For more information, contact the Office of International Education at (920) 465-2190 or see <https://www.uwgb.edu/international-education/>.

Major*

| Code | Title | Credits |
|---|---|-----------|
| Supporting Courses | | 36 |
| BIOLOGY 201 | Principles of Biology: Cellular and Molecular Processes | |
| BIOLOGY 202 | Principles of Biology Lab: Cellular and Molecular Processes | |
| BIOLOGY 203 | Principles of Biology: Organisms and Evolution | |
| BIOLOGY 204 | Principles of Biology Lab: Organisms and Evolution | |
| CHEM 211 | Principles of Chemistry I | |
| CHEM 212 | Principles of Chemistry II | |
| CHEM 213 | Principles of Chemistry I Laboratory | |
| CHEM 214 | Principles of Chemistry II Laboratory | |
| ENV SCI 239 | Scientific Writing | |
| ENV SCI 250 | Introduction to Geographic Information Systems (GIS) | |
| GEOSCI 202 | Physical Geology | |
| MATH 260 | Introductory Statistics | |
| Mathematics (choose one of the following courses): | | |
| MATH 104 | Precalculus | |
| MATH 202 | Calculus and Analytic Geometry I | |
| MATH 203 | Calculus and Analytic Geometry II | |
| Upper-Level Courses ¹ | | 34 |
| BIOLOGY 306 | Principles of Ecology | |
| ENV SCI 305/505 | Environmental Fate and Transport [#] | |
| ENV SCI 336 | Environmental Statistics | |
| Elective Courses (choose 15 credits): | | |
| BIOLOGY 469/669 | Conservation Biology [#] | |
| ENV SCI 301 | Radioactivity: Past, Present, and Future | |
| ENV SCI 303 | Environmental Sustainability | |
| ENV SCI 320/520 | The Soil Environment | |
| ENV SCI/ET 330/ENV SCI 530 | Hydrology [#] | |
| ENV SCI 335/535 | Water and Waste Water Treatment [#] | |
| ENV SCI 337/537 | Environmental GIS [#] | |
| ENV SCI 338 | Environmental Modeling | |
| ENV SCI 401/601 | Stream Ecology [#] | |
| ENV SCI 403/603 | Limnology [#] | |
| ENV SCI/ET 415/ENV SCI 615 | Solar and Alternate Energy Systems [#] | |
| ENV SCI 424/624 | Hazardous and Toxic Materials [#] | |
| ENV SCI 425/625 | Global Climate Change [#] | |
| ENV SCI 433/633 | Ground Water: Resources and Regulations [#] | |
| ENV SCI 460/660 | Resource Management Strategy [#] | |
| ENV SCI 464/664 | Atmospheric Pollution and Abatement [#] | |
| ENV SCI 467 | Research Experience in Environmental Science | |
| ENV SCI 491 | Senior Thesis/Research in Environmental Science | |
| BIOLOGY 310/510 | Plant Biodiversity [#] | |
| BIOLOGY 320/520 | Field Botany [#] | |
| BIOLOGY 322/522 | Environmental Microbiology [#] | |
| BIOLOGY 357/557 | Marine Biology [#] | |
| BIOLOGY 401/601 | Fish and Wildlife Population Dynamics [#] | |
| BIOLOGY 449/649 | Wetland Ecology [#] | |
| BIOLOGY 450/650 | Ecological Restoration [#] | |
| GEOSCI 402/602 | Sedimentology & Stratigraphy [#] | |
| GEOSCI 421/621 | Geoscience Field Trip [#] | |
| GEOSCI 432/632 | Hydrogeology | |

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| GEOSCI 470/670 | Glacial Geology & Landscapes | |
| WATER 444/644 | Aqueous Geochemistry [#] | |
| Total Credits | | 70 |

¹ Students intending to pursue graduate study should include additional course work of at least one year of calculus, at least one year of physics, and upper-level courses in organic chemistry.

[#] Students must be granted permission through the department to enroll in graduate level coursework. For more information, contact the Education office or refer to the graduate catalog (<http://catalog.uwgb.edu/graduate/general-information/academic-rules-regulations/undergrad-in-accelerated/>).

* includes an accelerated option - Integrated with the graduate Environmental Science and Policy program

Minor (<http://catalog.uwgb.edu/undergraduate/programs/environmental-science/minor/>)

| Code | Title | Credits |
|---------------------------|-------|----------|
| Supporting Courses | | 7 |

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|----------------|--|
| ENV SCI 102 | Introduction to Environmental Sciences |
| or ENV SCI 203 | Environmental Sustainability |
| MATH 260 | Introductory Statistics |

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|---|-----------|
| Upper-Level Courses ¹ | 12 |
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Choose 12 credits (no more than 6 credits from ENV SCI 497, 498, 499):

| | |
|------------------------------|---------------------------------------|
| any 300-level ENV SCI course | |
| any 400-level ENV SCI course | |
| BIOLOGY 306 | Principles of Ecology |
| BIOLOGY 310 | Plant Biodiversity |
| BIOLOGY 320 | Field Botany |
| BIOLOGY 322 | Environmental Microbiology |
| BIOLOGY 401 | Fish and Wildlife Population Dynamics |
| BIOLOGY 357 | Marine Biology |
| BIOLOGY 449 | Wetland Ecology |
| BIOLOGY 450 | Ecological Restoration |
| BIOLOGY 469 | Conservation Biology |
| BIOLOGY 499 | Travel Course |
| ET 424 | Hazardous and Toxic Materials |
| ET 464 | Atmospheric Pollution and Abatement |
| GEOSCI 325 | Regional Climatology |
| GEOSCI 421 | Geoscience Field Trip |
| GEOSCI 432 | Hydrogeology |
| GEOSCI 470 | Glacial Geology & Landscapes |
| WATER 321 | Stable Isotopes in the Environment |

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| Total Credits | 19 |
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¹ Additional courses may be necessary to satisfy prerequisites for the upper-level elective courses that a student selects.

Curriculum Guide

The following curriculum guide is for a four-year Environmental Science degree program and is subject to change without notice. Students should consult an Environmental Science program advisor to ensure that they have the most accurate and up-to-date information available about a particular four-year degree option.

An example: Four year plan for **Environmental Science Major**

120 credits necessary to graduate.

Plan is a representation and categories of classes can be switched. Check with your advisor.

| Course | Title | Credits |
|-------------------------------|--|-----------|
| Freshman | | |
| Fall | | |
| BIOLOGY 201 | Principles of Biology: Cellular and Molecular Processes | 3 |
| BIOLOGY 202 | Principles of Biology Lab: Cellular and Molecular Processes | 1 |
| CHEM 211 | Principles of Chemistry I | 4 |
| CHEM 213 | Principles of Chemistry I Laboratory | 1 |
| MATH 104 | Precalculus (or MATH 202 or MATH 203) | 4 |
| First Year Seminar | | 3 |
| Credits | | 16 |
| Spring | | |
| BIOLOGY 203 | Principles of Biology: Organisms and Evolution | 3 |
| BIOLOGY 204 | Principles of Biology Lab: Organisms and Evolution | 1 |
| CHEM 212 | Principles of Chemistry II | 4 |
| CHEM 214 | Principles of Chemistry II Laboratory | 1 |
| ENV SCI 102 | Introduction to Environmental Sciences | 3 |
| WF 100 or WF 105 | First Year Writing or Research and Rhetoric | 3 |
| Credits | | 15 |
| Sophomore | | |
| Fall | | |
| BIOLOGY 306 | Principles of Ecology | 4 |
| GEOSCI 202 | Physical Geology | 4 |
| MATH 260 | Introductory Statistics | 4 |
| POL SCI 101 or PUB ADM 202 | American Government and Politics or Introduction to Public Policy | 3 |
| Credits | | 15 |
| Spring | | |
| ENV SCI 250 | Introduction to Geographic Information Systems (GIS) | 3 |
| ENV SCI 303 | Environmental Sustainability (or ENV SCI 460 or PU EN AF 301 or Pu En Af 378) | 3 |
| ENV SCI 336 | Environmental Statistics | 3 |
| ENV SCI 337 | Environmental GIS | 3 |
| General Education/Elective | | 3 |
| General Education/Elective | | 3 |
| Credits | | 18 |
| Junior | | |
| Fall | | |
| ENV SCI 305 | Environmental Fate and Transport | 4 |
| ENV SCI 338 | Environmental Modeling | 2 |
| ENV SCI 339 | Scientific Writing | 3 |
| General Education/Elective | | 3 |
| General Education/Elective | | 3 |
| Credits | | 15 |
| Spring | | |
| ENV SCI Upper Level Elective | | 3 |
| General Education/Elective | | 3 |
| General Education/Elective | | 3 |
| General Education/Elective | | 3 |
| General Education/Elective | | 3 |
| Credits | | 15 |
| Senior | | |
| Fall | | |
| ENV SCI 467 or ENV SCI 491 | Research Experience in Environmental Science or Senior Thesis/Research in Environmental Science | 4 |
| ENV SCI Upper Level Elective | | 3 |
| General Education/Elective | | 3 |
| General Education/Elective | | 3 |
| General Education/Elective | | 3 |
| Credits | | 16 |
| Spring | | |
| ENV SCI Upper Level Elective | | 3 |
| General Education/Elective | | 3 |

| | |
|----------------------------|------------|
| General Education/Elective | 3 |
| General Education/Elective | 3 |
| General Education/Elective | 3 |
| Credits | 15 |
| Total Credits | 125 |

Engineering Dual Degree

Cooperative Program in Civil & Environmental Engineering with University of Wisconsin-Milwaukee

Advisers — John Katers, professor; Patricia A. Terry, professor and coordinator

Website: www.uwgb.edu/nas/ (<http://www.uwgb.edu/nas/>)

Dual Degree Program

UW-Green Bay and UW-Milwaukee also offer a Dual Degree Program in environmental science and civil and environmental engineering. Under this program a student completes three years of study in the Environmental Science major at UW-Green Bay, then transfers to UW-Milwaukee and continues for two years in the civil/environmental engineering major. Upon completion of an outlined series of courses, the student receives both a B.S. degree from UW-Green Bay in Environmental Science and a B.S. degree from UW-Milwaukee in Civil/Environmental Engineering. Students wishing to enroll in this program should see an engineering adviser prior to registration in their freshman year.

Participants in the NEW Engineering Program typically complete 60 to 72 credits at UW-Green Bay toward the degree. This includes the completion of 18 credits of general education requirements specific to this program:

- 3 credits minimum in the arts
- 6 credits minimum in the humanities
- 6 credits minimum in the social sciences
- 3 credits in cultural diversity

General education courses are required of all students. These courses complement and enhance major coursework for additional exposure to other areas of knowledge and bring an understanding of the relationship among and between subject areas. At least 9 of the 18 required credits must be from courses at the 200-level or above or from 100-level courses that require at least one prerequisite.

A grade of C or better in WF 105 will satisfy UW-Milwaukee's English composition requirement.

UW-Green Bay students are eligible to apply for advancement into the major at UW-Milwaukee at the point of transfer. The UW-Green Bay Academic Advising Office has forms. The filing deadlines are October 1 for spring semester, February 15 for summer session, and June 1 for fall semester.

For information on other engineering options, refer to the Preprofessional Programs of Study section of this catalog or contact one of the engineering advisers listed above.

Requirements for the Cooperative Program

All engineering and dual degree majors must take:

| Code | Title | Credits |
|-------------------------|---------------------------------------|-----------|
| Required Courses | | |
| CHEM 211 | Principles of Chemistry I | 4 |
| CHEM 212 | Principles of Chemistry II | 4 |
| CHEM 213 | Principles of Chemistry I Laboratory | 1 |
| CHEM 214 | Principles of Chemistry II Laboratory | 1 |
| MATH 202 | Calculus and Analytic Geometry I | 4 |
| MATH 203 | Calculus and Analytic Geometry II | 4 |
| MATH 209 | Multivariate Calculus | 4 |
| ME 213 | Mechanics I | 3 |
| ME 214 | Mechanics II | 3 |
| PHYSICS 201 | Principles of Physics I | 4 |
| PHYSICS 202 | Principles of Physics II | 4 |
| WF 100 | First Year Writing | 3 |
| Total Credits | | 39 |

See an adviser for additional requirements in aerospace, chemical, nuclear, and petroleum engineering.

Faculty

Mathew E Dornbush; Professor; Ph.D., Iowa State University*

Michael L Draney; Professor; Ph.D., University of Georgia*

Patrick S Forsythe; Professor; Ph.D., Michigan State University, chair*

John F Katers; Professor; Ph.D., Marquette University*

John A Luczaj; Professor; Ph.D., Johns Hopkins University*

Mohammad Mahfuz; Professor; Ph.D., University of Ottawa*

Patricia A Terry; Professor; Ph.D., University of Colorado*

Michael E Zorn; Professor; Ph.D., University of Wisconsin - Madison*

Lisa Grubisha; Associate Professor; Ph.D., University of California - Berkeley*

Jeremy J Intemann; Associate Professor; Ph.D., Iowa State University*

Tetyana Malysheva; Associate Professor; Ph.D., University of Oklahoma

Michael J McIntire; Associate Professor; Ph.D., University of California - Riverside

Brian Welsch; Associate Professor; Ph.D., Montana State University

Julie M Wondergem; Associate Professor; Ph.D., Marquette University

Elie Atallah; Assistant Professor; Ph.D., University of Central Florida

Mary E Guy; Associate Teaching Professor; M.S., University of Wisconsin - Oshkosh