CONSERVATION AND ENVIRONMENTAL SCIENCES, BS

At UWM, students with a passion for nature and the environment can obtain a solid education in the natural sciences that are central to environmental science - biology, geosciences, and chemistry - and the social sciences of geography, economics, and politics which guide the application of conservation and environmental science in the real world.

Students at UWM can focus their conservation and environmental science work around land resources, water resources, biological resources/biodiversity, or environmental analysis. Internships and field work complement classroom learning. These opportunities can be found locally at UWM's own Field Station (http://uwm.edu/letters-science/programs/?discipline=Field+Station), on Lake Michigan aboard UWM's R/V Neeskay vessel, and at local agencies, or abroad in places as far flung as Iceland, Africa, Romania and the Caribbean.

An active Conservation Club is another student advantage at UWM. Activities range from on-campus sustainability projects to professional networking and more.

UWM's CES major builds on students' passion to solve environmental issues through either a BS or a BA degree. The BS requires more courses in math, biology, chemistry, and science and is suitable for careers in field or laboratory work, while the BA has fewer electives in science for a career in public programming, education, or administration.

Because of the breadth and flexibility of this major, students should consult with the Director and/or Coordinator to plan a course of study, preferably before the start of their sophomore year. It is particularly important to begin the introductory course sequences early, since they are prerequisites for advanced courses.

It is recommended that students obtain at least one semester of practical work or internship experience, either as an employee or as a volunteer, with state or federal resource management agencies, consulting firms, conservation or environmental organizations, or with nature centers or local parks.

Course of Study – Bachelor of Science Degree

Complete 120 credits including 75 credits in the College of Letters & Science and with 36 of the 75 credits in L&S upper-level (numbered above 300) courses and 30 of those 36 credits in designated L&S Advanced Natural Science courses (https://catalog.uwm.edu/letters-science/approved-courses-advanced-natural-science/).

The College requires that students complete in residence at UWM at least 15 credits in upper-division (numbered 300 or above) courses in their major. The College also requires that students complete at least 30 credits overall in residence at UWM. For additional residency and transfer credit limitations, see L&S Undergraduate Policies and Regulations (https://catalog.uwm.edu/letters-science/#policiesandregulationstext).

Students are also required to complete University-wide General Education Requirements (https://catalog.uwm.edu/policies/undergraduate-policies/#bachelorsdegreegeneraleducation) and the specific L&S requirements listed below.

To complete a major, students must satisfy all the requirements of the major as stated in this catalog. Students who declare their majors within five years of entering the UW System as a degree candidate may satisfy the requirements outlined in any catalog issued since the time they entered. Credits used to satisfy the major also may be used to satisfy other degree requirements.

University General Education Requirements (GER)

Code	Title	Credits
Oral and Written Communication		
Part A		
Achieve a grade of C or better in the following course:		
ENGLISH 102	College Writing and Research (or equivalent)	
Part B		
Course designated as OWC-B; may be completed through a major-specific course requirement		
Quantitative Literacy		
Part A		
Earn at least 3 credits with a grade of C or higher in one of the following courses or an equivalent course, or achieve a placement code of at least 30 on the mathematics placement test (or other appropriate test, as determined by the Mathematical Sciences Department)		
MATH 102	Mathematical Literacy for College Students II	
MATH 103	Contemporary Applications of Mathematics	
MATH 105	Introduction to College Algebra	
MATH 108	Algebraic Literacy II	
MATH 111	Introduction to Logic - Critical Reasoning [1]	
or PHILOS 111	Introduction to Logic - Critical Reasoning	
MATH 116	College Algebra	
Or equivalent course		
Part B		
Course designated as QL-B; may be completed through a major-specific course requirement		
Arts		
Select 3 credits		3
Humanities		
Select 6 credits		6
Social Sciences		
Select 6 credits		6
Natural Sciences		
Select 6 credits (at least two courses including one lab)		6
UWM Foreign Language Requirement		
Complete Foreign Language Requirement through:		
Two years (high school) of a single foreign language		
Two semesters (college) of a single foreign language		
Or equivalent		
UWM Cultural Diversity Requirement		

One course from the Arts, Humanities, or Social Sciences must also satisfy UWM's Cultural Diversity requirement

[1] Math 111 and Philosophy 111 are jointly offered and count as repeats of one another. Students cannot receive credit for both courses.

College of Letters & Science Requirements

The degree requirements in the College of Letters and Science build on the University General Education Requirements to provide a broad base of knowledge as well as an array of skills cited by employers as critical to professional success: critical thinking, problem solving, oral and written communication, ability to work well with others, and adaptability to change.

For the Bachelor of Science (B.S.), you must complete the UWM General Education Requirements as well as these L&S requirements: the International requirement, the Breadth requirement, and the Research requirement. The International requirement develops your potential for cross-cultural understanding in a globalizing world. The Breadth requirement ensures that you take classes in a wide variety of subjects, across humanities, natural sciences, and social sciences. The Research requirement calls for you to build your critical thinking and oral and written communication skills through conducting an independent research project, usually in your major.

For the Bachelor of Science (B.S.) you will complete additional coursework in L&S Advanced Natural Science courses (https://catalog.uwm.edu/letters-science/approved-courses-advanced-natural-science/).

I. Total Credits and Upper-Division Courses Requirement

Students must complete 120 credits including 75 credits in the College of Letters & Science and with 36 of the 75 credits in L&S upper-level (numbered above 300) courses.

II. L&S Advanced Natural Sciences Requirement

For the Bachelor of Science, students must complete 30 credits of the 36 credits in upper-division courses in designated L&S Advanced Natural Science courses (https://catalog.uwm.edu/letters-science/approved-courses-advanced-natural-science/).

III. International Requirement

To meet the International Requirement, students must successfully complete some three course (minimum 9 credits) combination of

1. language other than English (*not* including American Sign Language) at 3rd semester level or above, ***and/or***
2. non-language courses with L&S approved international content (see Courses Approved for the L&S International Requirement (https://catalog.uwm.edu/letters-science/approved-courses-international-requirement/) for course options).

IV. Breadth Requirement

In addition to completing the University General Education Requirements, L&S students must complete the Breadth requirement.

The L&S Breadth requirement calls for 6 credits each in L&S courses designated L&S Humanities, L&S Natural Sciences, and L&S Social Sciences breadth. One of the L&S Natural Science breadth courses must be a laboratory or fieldwork course. These courses must be beyond and in addition to courses in those areas used to satisfy General Education Requirements.

Please refer to the list of Courses Approved for the L&S Breadth Requirement (https://catalog.uwm.edu/letters-science/breadth-requirement-course-list/).

V. The Major

The College requires that students attain at least a 2.0 GPA in all credits in the major attempted at UWM. In addition, students must attain a 2.0 GPA on all major credits attempted, including any transfer work. Individual departments or programs may require higher GPAs for graduation. Some departmental majors require courses from other departments. Contact your major department for information on whether those credits will count as part of the major GPA. The College requires that students must complete in residence at UWM at least 15 credits in upper-division (numbered 300 or above) courses in their major.

Research Requirement

Within their majors, students must complete a research experience approved by the L&S faculty. A list of courses satisfying the research requirement in each major can be found here (https://catalog.uwm.edu/letters-science/approved-courses-research-requirement/).

VI. The Minor

Students are encouraged to consider completing a minor, but it is not required. To complete a minor, the College of Letters and Science requires that students attain at least a 2.0 GPA in all credits in the minor attempted at UWM. In addition, students must attain a 2.0 GPA on all minor credits attempted, including any transfer work. The minor must contain at least 9 credits in upper-division (numbered 300 and above) courses.

Conservation and Environmental Science Major Requirements

The **Conservation and Environmental Science** program requires a minimum of 54 credits, 29 of which are advanced-level. All students in the CES major must fulfill the required 36 credits (25 lower-level core credits, and 11 advanced-level credits) and an additional 18 advanced-level credits from among the approved CES upper-level electives.

Students must complete the courses listed below, including at least 15 upper-division (numbered 300 and above) credits in the major in residence at UWM. The College of Letters & Science requires that students attain at least a 2.0 GPA on all credits in the major attempted at UWM. In addition, students must attain a 2.0 GPA on all major credits attempted, including any transfer work.

Code	Title	Credits
Required Introductory Core		
BIO SCI 150	Foundations of Biological Sciences I	4
BIO SCI 152	Foundations of Biological Sciences II	4
CES 210	Introduction to Conservation and Environmental Science	3
CHEM 102	General Chemistry	5
GEO SCI 100 or GEOG 120	Introduction to the Earth Our Physical Environment	3
GEO SCI 102 or GEO SCI 150	Evolution of the Earth Introduction to Ocean Sciences	3
GEOG 215	Introduction to Geographic Information Science	3
Mid-Level Distributional Requirement		
BIO SCI 310	General Ecology	4

GEOG 350	Conservation of Natural Resources	3
Upper-Level Core		
Select 18 upper-level approved CES electives with at least 3 credits taken from each of the following areas		18
Biological Sciences		
Geosciences		
Geography		
Research Requirement		
CES 471	Practicum in Natural Resources Management	4
Total Credits		**54**

List of Approved Electives for the CES Major

Code	Title	Credits
ANTHRO 448	Cultural and Human Ecology	3
BIO SCI 315	Cell Biology	3
BIO SCI 325	Genetics	4
BIO SCI 358	Birds of Wisconsin	2
BIO SCI 370	Mammalian Physiology	3
BIO SCI 383	General Microbiology	4
BIO SCI 406	Marine Biology	3
BIO SCI 440	Ecology and Evolution of Amphibians and Reptiles	3
BIO SCI 451	Field Methods in Conservation	3
BIO SCI 465	Biostatistics	3
BIO SCI 480	Ecological Genetics	3
BIO SCI 489	Internship in Biological Sciences, Upper Division	1-6
BIO SCI 500	Plant Physiology	3
BIO SCI 501	Plant and Aquatic Ecophysiology Laboratory	3
BIO SCI 502	Introduction to Programming and Modeling in Ecology and Evolution	3
BIO SCI 505	Conservation Biology	3
BIO SCI 512	Limnology I	3
BIO SCI 523	Evolution and Ecology of Birds	3
BIO SCI 532	Behavioral Ecology	3
BIO SCI 540	Microbial Diversity and Physiology	3
BIO SCI 562	Topics in Field Biology:	1-2
BIO SCI 611	Seminar on Recent Advances in Limnology and Oceanography	2
BIO SCI 575	Evolutionary Biology	3
CES 390	Changing Climate: A Conservation and Sustainability Approach	3
CES 451	Field Methods in Conservation	3
CES 461	The Politics and Policy of Sustainability	3
CES 489	Internship in Environmental Studies, Upper Division	1-6
CES 497	Study Abroad:	1-12
CES 499	Ad Hoc:	1-6
CES 515	Environmental Law for Natural Resource Managers	3
CES 651	Principles of Stream Management and Restoration	3
CHEM 341	Introductory Survey of Organic Chemistry	3
CHEM 342	Introductory Organic Chemistry Laboratory	2
CHEM 343	Organic Chemistry	3
CHEM 344	Organic Chemistry Laboratory	2
CHEM 345	Organic Chemistry	3
CHEM 501	Introduction to Biochemistry	3
CHEM 524	Instrumental Analysis	3
CHEM 560	Biophysical Chemistry	3
CHEM 603	Introduction to Biochemistry Laboratory	2
ECON 328	Environmental Economics	3
GEOG 304	Human Impact on the Environment	3
GEOG 306	Natural Hazards	3
GEOG 310	General Climatology	3
GEOG 325	Data Science and Environmental Applications	4
GEOG 340	Biogeography	3
GEOG 403	Remote Sensing: Environmental and Land Use Analysis	4
GEOG 405	Cartography	4
GEOG 415	The Water Environment	3
GEOG 450	Climates of the Past and Climate Change	3
GEOG 464	Environmental Problems	3
GEOG 515	Watershed Analysis and Modeling	3
GEOG 520	Physical Geography of the City	3
GEOG 525	Geographic Information Science	4
GEOG 547	Spatial Analysis	4
GEOG 564	Urban Environmental Change and Social Justice	3
GEOG 625	Intermediate Geographic Information Science	4
GEOG 650	Geography Field Work	3
GEO SCI 301	Principles of Mineralogy	4
GEO SCI 400	Water Quality	4
GEO SCI 409	Process Geomorphology	4
GEO SCI 421	Conservation Paleontology	3
GEO SCI 422	Plant-Insect Interactions in Deep Time	3
GEO SCI 443	Glacial and Pleistocene Geology	4
GEO SCI 463	Physical Hydrogeology	4
GEO SCI 464	Chemical Hydrogeology	4
GEO SCI 511	Stratigraphy and Sedimentation	4
GEO SCI 515	Physical Sedimentology	4
GEO SCI 520	Introduction to Paleontology	4
GEO SCI 525	Terroir: Geology in a Glass	3
GEO SCI 562	Environmental Surface Hydrology	3
GEO SCI 563	Field Methods in Hydrogeology	4
GEO SCI 696	Topics in the Geological Sciences:	1-3
GEO SCI 697	Seminar in the Geological Sciences:	1-3
PHILOS 337	Environmental Ethics	3
POL SCI 383	Environmental Political Theory	3

Approved CES Course Electives Outside of the College of Letters and Science

Although the following courses may count as credits toward the CES major requirements, they do not count to satisfy the advanced L&S credits requirement for the degree. Consult the Coordinator before enrolling in any of these courses.

Code	Title	Credits
ARCH 340	Urban Design	3
ATM SCI 330	Air-Pollution Meteorology	3
CIV ENG 492	Environmental Impact Assessment	3
FRSHWTR 322	Ecology and Evolution of Freshwater Organisms	3
FRSHWTR 361	Introduction to Environmental Data Systems	3
FRSHWTR 391	Water and Natural Resource Economics	3
FRSHWTR 392	Water, Energy, Food, and Climate	3
FRSHWTR 393	Water Law, Policy, and the Environment	3
FRSHWTR 471	Introduction to Sensing Networks	3
FRSHWTR 502	Aquatic Ecosystem Dynamics	3
FRSHWTR 504	Quantitative Freshwater Analysis	3
FRSHWTR 506	Environmental Health of Freshwater Ecosystems	3
FRSHWTR 510	Economics, Policy and Management of Water	3
FRSHWTR 512	Freshwater Sciences Practicum:	2-4
FRSHWTR 563	Fish Nutrition and Physiology	3
FRSHWTR 567	Fish Health	3
PH 346	Environmental Health and Disease	3
PH 375	Topics in Public Health:	3
URBPLAN 591	Introduction to Urban Geographic Information Systems (GIS) in Planning	3

Conservation and Environmental Science BA/BS Learning Outcomes

Students graduating from the Conservation and Environmental Science program will be able to:

- Students will be able to **describe**, **summarize**, and **explain** the core concepts and frameworks of earth science, biological science, and chemistry.
- Students will be able to **apply** science as a process to environmental problems and solutions.
- Students will be able to **relate** the social, political, and economic processes that contribute to environmental problems and solutions.
- Students will be able to **explain** policy and regulatory processes that contribute to environmental problems and solutions.
- Students will be able to **analyze** coupled human and environmental systems using a systems thinking approach.
- Students will be able to **critique** various perspectives of environmental issues.
- Students will be able to **develop** and **present** a proposed solution to a complex environmental problem.
- Students will be able to **effectively communicate** environmental science to the public.

Declaration of Major

Students wishing to declare the major can obtain the necessary information and materials from CES Program Coordinator's office (Lapham Hall, Room 366) or from their College of Letters and Science advisor.

Letters & Science Advising

During your time at UWM, you may have multiple members of your success team, including advisors, peer mentors and success coaches. Letters & Science students typically work with at least two different types of advisors as they pursue their degrees: professional college advisors and faculty advisors. L&S college advisors advise across your entire degree program while departmental faculty advisors focus on the major.

College advisors are located in Holton Hall (or virtually for online students) and serve as your primary advisor. They are your point person for your questions about navigating college and completing your degree. College advisors will:

- Assist you in defining your academic and life goals.
- Help you create an educational plan that is consistent with those goals.
- Assist you in understanding curriculum, major and degree requirements for graduation, as well as university policies and procedures.
- Provide you with information about campus and community resources and refer you to those resources as appropriate.
- Monitor your progress toward graduation and completion of requirements.

Faculty advisors mentor students in the major and assist them in maximizing their development in the program. You will begin working with a faculty advisor when you declare your major. Faculty advisors are an important partner and will:

- Help you understand major requirements and course offerings in the department.
- Explain opportunities for internships and undergraduate research and guide you in obtaining those experiences.
- Serve as an excellent resource as you consider potential graduate programs and career paths in your field.

Students are encouraged to meet with both their college advisor and faculty advisor at least once each semester. Appointments are available in-person, by phone or by video.

Currently enrolled students should use the Navigate360 website (https://uwm.navigate.eab.com/) to make an appointment with your assigned advisor or call (414) 229-4654 if you do not currently have an assigned Letters & Science advisor. Prospective students who haven't enrolled in classes yet should call (414) 229-7711 or email let-sci@uwm.edu.

College of Letters and Science Dean's Honor List

GPA of 3.750 or above, earned on a full-time student's GPA on 12 or more graded credits in a given semester.

Honors College Degree and Honors College Degree with Distinction

Granted to graduating seniors who complete Honors College requirements, as listed in the Honors College (https://catalog.uwm.edu/honors-college/) section of this site.

Commencement Honors

Students with a cumulative GPA of 3.500 or above, based on a minimum of 40 graded UWM credits earned prior to the final semester, will receive all-university commencement honors and be awarded the traditional gold cord at the December or May Honors Convocation. Please note that for honors calculation, the GPA is **not** rounded and is truncated at the third decimal (e.g., 3.499).

Final Honors

Earned on a minimum of 60 graded UWM credits: Cum Laude - 3.500 or above; Magna Cum Laude - 3.650 or above; Summa Cum Laude - 3.800 or above.