ENVIRONMENTAL ENGINEERING, BSE

Environmental Engineering at UWM

Environmental engineers use the principles of engineering, soil science, biology and chemistry to develop solutions to environmental problems. Environmental engineers work to improve drinking water supply, public health, recycling, sustainability, to control water and air pollution, and manage waste.

Areas of Specialization

- Water and wastewater treatment
- Air quality
- Environmental remediation
- Environmental technology
- Energy and sustainability
- Water resources management
- Environmental health

Career Paths

- Engineering services
- Consulting, scientific and management services
- Environmental engineering in all levels of government and throughout the private sector
- Water project manager
- Environmental health and safety engineer

New Freshmen

Admission to the College of Engineering and Applied Science is based on an overall assessment of both academic and non-academic qualifications. The primary review factors for admission are the strength and quality of the high school curriculum, high school class percentile, grade point average, and the result of the ACT or SAT. Well-prepared freshman applicants will have four years of mathematics (including one-and-a-half years of algebra, one year of geometry, and one-half year of trigonometry) and four years of natural science (including biology, chemistry, and physics). The College also will consider non-academic qualifications such as leadership skills, diversity in personal background, work experience, motivation, and maturity.

Freshmen applicants will be considered for admission directly to the major or to the First-Year Program. Admission directly to the major is selective.

Transfer Students

Transfer student admission is based on an overall assessment of both academic and non-academic qualifications. For transfer applicants, the primary factors considered for admission are the grade point average on transferable courses and the level of curriculum completion. The College also will consider non-academic qualifications such as leadership skills, diversity in personal background, work experience, motivation, and maturity.

Transfer applicants will be considered for admission directly to the major or the Transfer Transition Program based on the number of transfer credits and GPA.

Admission to the Major

Students admitted to the First-Year Program or Transfer Transition Program (Engineering-intended or Computer Science-intended) may apply for major status with their academic advisor at the time they believe they meet the requirements. The program may impose major status as a prerequisite for courses numbered 200 or above.

1. Complete first semester calculus with a C or better grade.
2. Complete GER Oral and Written Communication Part A.
3. Engineering majors must complete Chem 100 with a C or better grade (or satisfactory score on the placement test). Computer Science majors must complete CompSci 251 with a C or better grade.
4. Obtain a minimum grade point as set by the major department. A 3.00 GPA guarantees admission to any CEAS major.
5. Courses required by the major may be repeated only once. No more than two courses may be repeated.

First-Year students have a maximum of three semesters to complete the admission to major requirements. Part-time students may be granted an extension by their academic advisor.

Transfer Transition students have a maximum of two semesters to complete the admission to major requirements. Part-time students may be granted an extension by their academic advisor.

Placement Testing

Most new freshmen are required to take placement exams in English and mathematics. Engineering students also take a placement exam in chemistry, provided they have had previous coursework in chemistry. Students with previous college-level credits in chemistry, English, and math may not be required to take placement tests. Additional prerequisite coursework may be required as a result of these placement tests.

Credit for prerequisite academic work may not count toward the degree program. Entering students are urged to take their placement exams when scheduled. All placement exams must be completed before beginning coursework in the subject area. Students who place into precalculus math courses may be asked to participate in an online summer bridge program.

Questions on admission to CEAS or choosing a major should be directed to the Office of Student Services, (414) 229-4667.

Environmental Engineering Curriculum

The minimum number of credits required to complete the Bachelor of Science in Engineering with a major in environmental engineering is 125. Students who need background preparation courses in math, English, foreign language, and chemistry may need additional credits.

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
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</tr>
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11. Listed only for majors.
12. Listed only for non-majors.
13. Listed only for majors.
14. Listed only for non-majors.
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MECHENG 301 Basic Engineering Thermodynamics 3
MECHENG 320 Introduction to Fluid Mechanics 3

Environmental Engineering Major
CIV ENG 311 Introduction to Energy, Environment and Sustainability 3
CIV ENG 411 Engineering Principles of Water Resources Design 3
CIV ENG 412 Applied Hydrology 3
CIV ENG 413 Environmental Engineering 3
CIV ENG 511 Water Supply and Sewerage 3
CIV ENG 521 Water Quality Assessment 3
CIV ENG 495 Senior Design 3

Mathematics Requirement 14-16
Select one of following Calculus sequences:

Sequence 1:
MATH 231 Calculus and Analytic Geometry I
& MATH 232 and Calculus and Analytic Geometry II
& MATH 233 and Calculus and Analytic Geometry III

Sequence 2:
MATH 221 Honors Calculus I
& MATH 222 and Honors Calculus II
ELECENG 234 Analytical Methods in Engineering 4

Chemistry Requirement 5-10
CHEM 102 General Chemistry
& CHEM 104 General Chemistry and Qualitative Analysis
or CHEM 105 General Chemistry for Engineering

Physics Requirement
PHYSICS 209 Physics I (Calculus Treatment) 4
PHYSICS 210 Physics II (Calculus Treatment) 4

Other Natural Sciences
BIO SCI 150 Foundations of Biological Sciences I 4
Select one of the following:
Any ATM SCI course 150 level or above
Any BIO SCI course 150 level or above
Any GEO SCI course 150 level or above

GER Distribution Requirement
Select 3 credits in Art 3
Select 3 credits in Humanities 3
Select 6 credits of Social Science 6
ENGLISH 310 Writing, Speaking, and Technoscience in the 21st Century 3

Cultural Diversity - Arts, Humanities, or Social Science course must also satisfy UWM Cultural Diversity Requirement

English Composition Requirement 0-6
Select one of the following: 3
Earn a satisfactory score on the English placement test; or
Earn a grade of C or higher in ENGLISH 102; or
Transfer a grade of C or better in a course (3 credits of more) equivalent to English 102 or higher level expository writing course

Foreign Language Requirement 0-8
Select one of the following:

Complete two years of a single foreign language in high school; or
Complete two semesters of a single foreign language in college; or
Demonstrate ability by examination

Technical Electives 15
CIV ENG 303 Strength of Materials
CIV ENG 335 Soil Mechanics
CIV ENG 480 Software Applications for Civil Engineering
CIV ENG 490 Transportation Engineering
CIV ENG 492 Environmental Impact Assessment
CIV ENG 555 Sustainable Construction Materials and Technologies
CIV ENG 610 Introduction to Water and Sewage Treatment
CIV ENG 614 Hazardous Waste Management
CIV ENG 616 Computational Hydraulics and Environmental Flows

ELECENG/MECHENG 430 Energy Modeling
FRSHWTR 502 Aquatic Ecosystem Dynamics
FRSHWTR 504 Quantitative Freshwater Analysis
FRSHWTR 506 Environmental Health of Freshwater Ecosystems
FRSHWTR 510 Economics, Policy and Management of Water
GEOG 216 Geography of the United States and Canada
GEOG 400 Population, Environment, Development
GEOG 403 Remote Sensing: Environmental and Land Use Analysis
GEO SCI/FRSHWTR 464 Chemical Hydrogeology
GEO SCI 562 Environmental Surface Hydrology
IND ENG 455 Operations Research I
MATLENG 460 Nanomaterials and Nanomanufacturing
MECHENG 321 Basic Heat Transfer
MECHENG 436 Solar Engineering
PH 303 Climate Change, the Environment and Human Health
URBPLAN 591 Introduction to Urban Geographic Information Systems (GIS) in Planning

1 MECHENG 110 and MECHENG 111 may substitute for IND ENG 111 and IND ENG 112 for students transferring from another engineering major.
2 Environmental engineering majors may take CIV ENG 431 ([https://catalog.uwm.edu/search/?P=CIV%20ENG%20431](https://catalog.uwm.edu/search/?P=CIV%20ENG%20431)) (with proper prerequisites) in place of MATLENG 201 ([https://catalog.uwm.edu/search/?P=MATLENG%20201](https://catalog.uwm.edu/search/?P=MATLENG%20201)).
Institutions must obtain prior permission from their academic advisor.

Concurrent Registration at Other Institutions

Students wishing to major in more than one field can do so in two ways:

1. Complete the requirements for more than one major before receiving a degree from the College. In this case, the degree will list both majors.
2. Be admitted to the College as a second degree candidate (after earning a bachelor's degree in any field), providing University and College entrance requirements are met. Such a student must meet all undergraduate degree requirements in the College and present a minimum of 30 credits beyond the previous bachelor's degree.

Minimum Requirements

Students must maintain an average GPA of at least 2.00 on all work attempted at the University and in all courses offered by the College. Students majoring in biomedical engineering, computer engineering, computer science, industrial engineering, and materials engineering must maintain an average GPA of at least 2.00 in all 300-level and above courses in the student's major department. Students majoring in civil engineering, electrical engineering, and mechanical engineering must maintain an average GPA of at least 2.50 in all 300-level and above courses in the major department. Transferable courses will be included as appropriate. Advancement to major status is required for graduation.

In order to provide maximum flexibility while preserving the institutional identity of a UWM degree, the College requires residence:

1. during the last 30 credits, or
2. during 45 of the last 60 credits, or
3. during any 90 credits of a student's undergraduate career.

At least 15 credits of advanced work in the major must be completed in residence at UWM.

A student who does not maintain continuous registration during the academic year and is re-admitted to the College must meet the program and graduation requirements in effect at the time of re-entry.

Degree and major requirements must be completed within 10 years of initial enrollment at UW-Milwaukee. Should students not complete the major within the 10-year time frame, the students will switch to the most current degree and major requirements. A new 10-year time frame would then begin.

Dual Majors

Students wishing to major in more than one field can do so in two ways:

1. Complete the requirements for more than one major before receiving a degree from the College. In this case, the degree will list both majors.
2. Be admitted to the College as a second degree candidate (after earning a bachelor's degree in any field), providing University and College entrance requirements are met. Such a student must meet all undergraduate degree requirements in the College and present a minimum of 30 credits beyond the previous bachelor's degree.

Concurrent Registration at Other Institutions

CEAS students wishing to establish concurrent enrollment at another institution must obtain prior permission from their academic advisor.

Student Academic Appeals

Students may appeal an academic action to the Office of Student Services. An appeal is a request for an exception to an established policy or rule. The content of each appeal is carefully reviewed in order to reach a decision. Appeals should be submitted in writing to the Office of Student Services. The appeals committee considers individual cases concerning the degree requirements and other academic rules and regulations established by the College of Engineering and Applied Science faculty.

The College of Engineering and Applied Science has established written procedures for undergraduate student academic grievances. Copies of the grievance procedure are available in the Office of Student Services. As a first step, students must discuss the grievance with the faculty member or administrator as soon as possible to attempt to resolve the issue, but not later than 30 days after the action that prompted the grievance/appeal.

Computer Science and Engineering Programs

Detailed descriptions of the CEAS undergraduate programs are provided in this catalog. All courses are not offered every semester. A few technical elective courses may be offered only once every three to four semesters. In addition, since computer science and engineering curricula are continually evolving to keep current, students are encouraged to consult with their advisors to plan each semester's list of classes. Part-time students should always maintain a plan that looks ahead two to three semesters to avoid scheduling difficulties.

The curricula outlined in the pages are applicable to new students entering CEAS in fall 2016 or later. Students who enrolled in computer science or engineering programs prior to that date should consult with the appropriate previous editions of this catalog for information about their program requirements. As a general rule, when program changes occur, continuing students have the choice of continuing in their existing program or following the new requirements. Occasionally, a program change will be required of all students regardless of their date of matriculation, so long as it does not increase the total credits needed for graduation.

These program descriptions represent the minimum requirements for graduation from UWM in computer science or engineering. In all cases, it is important that students consult with their advisor before making course selections to avoid errors in programming.

Academic Advising

The Office of Student Services in the College of Engineering and Applied Science, located in Room E386 of the Engineering and Mathematical Sciences Building, offers undergraduate students academic advising from professional advisors who are familiar with the curriculum, College requirements, and the special needs of engineering and computer science students. These advisors provide services such as freshman orientation, course selection, program planning, and credit transfer evaluation. Students are assigned to a permanent professional advisor as soon as they are accepted into the College, and are urged to confer with their advisor at least once each semester. Students also are assigned to a faculty advisor who provides technical expertise specific to the student's area of study.
We understand that it can be a delicate balance managing school, work, family, and active social lives. The College of Engineering and Applied Science advisors are here to help you achieve that balance.

You will be assigned a professional academic advisor upon being admitted to the College of Engineering & Applied Science. Your advisor will work with you throughout your undergraduate experience, providing guidance on:

- course registration,
- graduation planning,
- career preparation,
- and serving as a liaison to the many other resources available on our campus.

Advisors are also a great source of information on student organizations, tutoring and scholarship opportunities.

In addition to professional academic advisors, you will also have access to faculty advisors. These advisors can provide insights into the technical aspects of the engineering and computer science curricula while mentoring you as you define your professional goals.

Program Educational Objectives

Graduates apply broad-based knowledge of mathematics, science, and engineering science for solving engineering and environmental problems.

Graduates demonstrate leadership in interdisciplinary efforts to create solutions for complex natural and urban environmental problems.

Graduates are leaders in the workplace and in professional organizations by demonstrating effective communication skills, ethical responsibility, and social awareness.

Graduates adapt to changes in the urban and global environment by exhibiting intellectual curiosity, innovating, pursuing continuous learning, and embracing diverse ideas.

Student Outcomes

Upon the completion of the program, graduates are expected to have:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analysis and interpret data, and use engineering judgement to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Honors in the College of Engineering and Applied Science

Dean's Honor List

GPA of 3.500 or above, earned on a full-time student's GPA on 12 or more graded credits in a given semester.

Honors Degree and Honors Degree with Thesis

Granted to graduating seniors who complete Honors College requirements, as listed in the Honors College (http://catalog.uwm.edu/opportunities-resources/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.

Joint Programs with Other Campuses

Pre-engineering

Qualified students may enroll in coordinated pre-engineering programs at UW-Green Bay, UW-Parkside, and UW-Waukesha for two years of pre-engineering coursework. These coordinated programs ensure equivalent coursework, appropriate advising, and early access to the Cooperative Education Program at UWM.

Dual Degree Programs

Qualified students may enroll in coordinated dual degree programs at Alverno College, Carroll University, UW-Eau Claire, UW-Green Bay, UW-La Crosse, UW-Oshkosh, UW-Stevens Point, UW-Whitewater and Wisconsin Lutheran College. Students in these programs will earn a bachelor's degree at both universities in five years. Students transfer to UWM after three years at the partner university. For more information, contact the Office of Student Services at (414) 229-4667.

Joint Programs with Wisconsin Technical Colleges

Gateway Technical College

An agreement with GTC allows those students having associate degrees in the Electrical Engineering - Technology the opportunity to be given credit for courses required in the UWM bachelor of science in engineering program. For more information, contact the Office of Student Services at (414) 229-4667.

Milwaukee Area Technical College

An agreement with MATC allows joint admission and enrollment at MATC and CEAS. Qualified students may take English, mathematics, chemistry, and general education courses at MATC. The program ensures equivalent coursework and appropriate advising. Students complete a bachelor of science degree in engineering or computer science at UWM.
Waukesha County Technical College
An agreement with WCTC allows those students having associate degrees in the Industrial Occupations Division at WCTC the opportunity to be given credit for courses required in the UWM bachelor of science in engineering or bachelor of science in computer science program. For more information, contact the Office of Student Services at (414) 229-4667.