ENVIRONMENTAL ENGINEERING (CAPITAL)

Graduate Program Head	Rafic Bachnak
Program Code	ENVE
Campus(es)	Harrisburg (M.Eng.)
Degrees Conferred	Master of Engineering (M.Eng.) Integrated B.S. in Civil Engineering and M.Eng. in Environmental Engineering
The Graduate Faculty	View (https://secure.gradsch.psu.edu/gpms/index.cfm?searchType=fac&prog=ENVE)

This program, offered at the Harrisburg campus, is intended for the engineer who wishes to pursue, either full-time or part-time, further training in the environmental field with a focus toward understanding the theory behind the design of environmental systems. Prospective students who do not have an undergraduate engineering degree, but rather hold a baccalaureate degree in a related scientific field (such as chemistry, microbiology, environmental science) may be admitted to the program but may need to take several prerequisite undergraduate engineering courses. This degree program builds on the Civil Engineering undergraduate program and complements the Environmental Pollution Control graduate programs (M.E.P.C. and M.S. in EPC) offered by the same faculty.

A variety of civil and environmental engineering courses are regularly offered, as well as specialty courses in environmental policy, other engineering areas, computer science, and other policy-related areas.

Admission Requirements

Applicants apply for admission to the program via the Graduate School application for admission (http://gradschool.psu.edu/prospective-students/how-to-apply). Requirements listed here are in addition to Graduate Council policies listed under GCAC-300 Admissions Policies (http://gradschool.psu.edu/graduate-education-policies).

Applicants are strongly encouraged to present an undergraduate degree in engineering from an ABET-accredited program. ABET (https://www.abet.org) is the accrediting body for engineering programs. However, those who possess an undergraduate degree in a related scientific field or unaccredited engineering program may be considered for admission; those students will need to take additional engineering courses at the undergraduate level in order to be adequately prepared.

All students are expected to have an undergraduate junior/senior grade-point average of 3.0 on a 4.0-point system. Exceptions to this minimum may be made for students with special backgrounds or abilities, or other qualifications.

All applicants must provide official transcripts from all post-secondary institutions attended (http://www.gradschool.psu.edu/prospective-students/how-to-apply/new-applicants/requirements-for-graduate-admission). In addition, applicants must supply a statement of objectives and three letters of recommendation.

The language of instruction at Penn State is English. English proficiency test scores (TOEFL/IELTS) may be required for international applicants.

See GCAC-305 Admission Requirements for International Students (http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-300/gcac-305-admission-requirements-international-students) for more information.

International applicants should be aware that processing of transcripts and other application-related information may take considerable time. While this program has a rolling admissions procedure, applicants must ensure that materials arrive at least three months prior to the start of the semester they first intend to begin studies. In addition, students who wish to be considered for a fellowship must submit their materials no later than January 30th.

Degree Requirements

Master of Engineering (M.Eng.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-700 Professional Degree Policies (http://gradschool.psu.edu/graduate-education-policies).

A minimum of 30 credits is required for the degree. Courses in the degree program may be taken at the 400 or 500 level, but a minimum of 18 credits must be at the 500 level.

All candidates are required to take core courses that provide a foundation and context for pursuing and successfully completing a master's program in environmental engineering. The following are the required core courses.

Code	Title	Credits
Required Courses		
EPC 590	Colloquium	1
ENVE 591	Research Methods in Environmental Engineering	1
CE 592	Environmental Engineering & Science Topics	1
Electives		
Select 15-16 credits of the following (at least one course from each core area): [2]		15-16
Core 1 (Chemistry)		
CE 475	Water Quality Chemistry	
or CE 570	Environmental Aquatic Chemistry	
Core 2 (Process Engineering)		
ENVE 411	Water Supply and Pollution Control	
ENVE 550	Chemical Fate and Transport	
CE 571	Physical-Chemical Treatment Processes	
CE 572	Biological Treatment Processes [3]	
CE 577	Treatment Plant Design	
Core 3 (Biology)		
ENVE 540	Biodegradation and Bioremediation	
CE 572	Biological Treatment Processes [3]	
CE 579	Environmental Pollution Microbiology	
Core 4 (Water Resources)		
ENVE 415	Hydrology [4]	
CE 561	Surface Hydrology [4]	
CE 462	Open Channel Hydraulics	
CE 555	Groundwater Hydrology: Analysis and Modeling	
CE 580	Hydrodynamic Mixing Processes	
Core 5 (Policy)		
ENVE 460	Environmental Law	

ENVE 569	Environmental Risk Assessment	
Select 8-9 additional credits [5]		8-9
Culminating Experience		
ENVE 594	Research Topics [1]	3
Total Credits		30

1. This program does require that all students complete a scholarly master's paper. The seminar and the paper count toward the 500-level requirement. It is expected that students will upload their master's papers to be available publically via ScholarSphere (https://scholarsphere.psu.edu).
2. In addition to the requirements listed above, students must take one course (3 or 4 credits per course) in each of the following five core areas of environmental engineering theory and design, and environmental policy: Chemistry; Process Engineering; Biology; Water Resources; and Environmental Policy. Students must take at least one course from each core area (as shown in the table below) for a total of 15-16 credits. All courses are 3 credits except for CE 475.
3. CE 572 is listed as approved for both Cores 2 and 3. Once the course is successfully completed, the course may count for one of the two core areas. An additional course is required in either Core 2 or 3, depending on the student's interest.
4. Because of similarity of the content (both are introductory hydrology courses), students will not be allowed to take both ENVE 415 and CE 561 for credit in the master's program.
5. The remaining 8 or 9 credits may be used by the student to specialize in an area of environmental engineering by taking classes offered not only by the Environmental Engineering Program but also from Mechanical Engineering and Civil Engineering. (e.g.,CE 578) In addition, certain courses from the Schools of Business and Public Administration may be approved on a course-by-course basis.

Course that meet the core area requirements include, but are not limited to, the courses in the table above. Courses that deviate from this tabulated list will require pre-approval from the student's adviser. If these courses were taken to meet degree requirements for a baccalaureate degree, they cannot be counted toward the graduate degree.

Integrated Undergrad-Grad Programs

Integrated B.S. in Civil Engineering and M.Eng. in Environmental Engineering

Requirements listed here are in addition to requirements listed in GCAC-210 Integrated Undergraduate-Graduate (IUG) Degree Programs (http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-200/gcac-210-integrated-undergraduate-graduate-degree-programs).

The Civil Engineering undergraduate and Environmental Engineering graduate programs offers a limited number of academically superior Bachelor of Science candidates the opportunity to enroll in an integrated, continuous program of study leading to both the Bachelor of Science in Civil Engineering and the Master of Engineering in Environmental Engineering. The ability to coordinate as well as concurrently pursue the two degree programs enables the student to earn the two degrees in five years.

Students must apply to the program via the Graduate School application for admission (http://www.gradschool.psu.edu/prospective-students/how-to-apply), and must meet all the admission requirements of the Graduate School and the Environmental Engineering graduate program for the Master of Engineering degree, listed in the Admission Requirements section. Students shall be admitted to an IUG program no earlier than the beginning of the third semester of undergraduate study at Penn State (regardless of transfer or AP credits accumulated prior to enrollment) and no later than the end of the second week of the semester preceding the semester of expected conferral of the undergraduate degree, as specified in the proposed IUG plan of study.

In consultation with an adviser, students must prepare a plan of study appropriate to this integrated program, and must present their plan of study in person to the head of the graduate program or the appropriate committee overseeing the integrated program prior to being admitted to the program. The plan should cover the entire time period of the integrated program, and it should be reviewed periodically with an adviser as the student advances through the program.

Students in the IUG program must satisfy the degree requirements for both Bachelor of Science and Master of Engineering degrees, subject to the double-counting of credits as outlined below. Degree requirements for the Bachelor of Science in Information Systems are listed in the Undergraduate Bulletin (http://bulletins.psu.edu/undergraduate). Degree requirements for the Master of Engineering in Environmental Engineering degree are listed on the Degree Requirements tab. However, the total course load is reduced due to the maximum of 10 credits that can count towards both degrees. A minimum of 7 credits proposed to count for both degrees must be at the 500 level. Master's paper credits may not be double-counted. The first three years of the IUG program are identical to the first three years of the Bachelor of Science program. The fourth year of the IUG program differs from that of the Bachelor of Science program due to the courses that count toward the Master of Engineering degree requirements. Students must sequence their courses so all undergraduate degree requirements are fulfilled before taking courses to count solely towards the graduate degree.

Students will be admitted on a provisional basis (http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-300/provisional-admission) late in their 6th semester so that they may be advised appropriately for the IUG 7th semester courses. Formal acceptance is contingent upon maintaining the 3.0 cumulative GPA through the 6th semester, and a collective GPA of 3.3 or better in courses designated MATH, CHEM, CE, or ENVE.

Student performance will be monitored on an on-going basis. In addition, a formal evaluation of student academic performance will be performed when the student has completed 114 to 115 credits, the end of the first semester of the senior year for a typical student in the program. Students who have not maintained a collective 3.3 GPA in courses designated MATH, CHEM, C E, or ENVE will be transferred to a probationary status. Students who have not maintained a collective GPA of 3.3 or better in courses designated MATH, CHEM, CE, or ENVE by the end of their eighth semester will be dropped from the graduate program but will continue in the Bachelor of Science C E degree program.

If for any reason a student admitted to the IUG program is unable to complete the requirements for the Master of Engineering degree, the student will be permitted to receive the Bachelor of Science degree, assuming all the undergraduate degree requirements have been completed satisfactorily. Students who successfully complete the courses listed in the recommended schedule will satisfy the requirements for the Bachelor of Science degree by the end of their fourth year.

Student Aid

Graduate assistantships available to students in this program and other forms of student aid are described in the Tuition & Funding (http://

gradschool.psu.edu/graduate-funding) section of The Graduate School's website. Students on graduate assistantships must adhere to the course load limits (http://gradschool.psu.edu/graduate-education-policies/gsad/gsad-900/gsad-901-graduate-assistants) set by The Graduate School.

Courses

Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate courses numbered between 400 and 499 may be used to meet some graduate degree requirements when taken by graduate students. Courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

Environmental Engineering (ENVE) Course List (https://bulletins.psu.edu/university-course-descriptions/graduate/enve)

Learning Outcomes

1. Graduates will demonstrate advanced knowledge of the theory and design of environmental engineering unit processes.
2. Graduates will understand environmental issues related to air, water, and soil pollution and how these issues are addressed by engineering.
3. Graduates will apply their knowledge of environmental unit processes to the design of a multi-step, integrated environmental treatment or natural resources system.
4. Graduates will demonstrate the application of environmental systems theory to the solution of real-world problems in Pennsylvania, the Chesapeake Bay watershed, and beyond.
5. Graduates will demonstrate an understanding of and will embody the professional ethics of the protection of health and safety first.
6. Graduates will communicate their research activities in a concise manner, both written and orally, and will be able to place their research into the broader context of environmental engineering.

Contact

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Program Website	View (https://harrisburg.psu.edu/science-engineering-technology/civil-structural-engineering/master-engineering-environmental-engineering)