

# ENVIRONMENTAL ENGINEERING

<b>Graduate Program Head</b>	Farshad Rajabipour
<b>Program Code</b>	ENV_E
<b>Campus(es)</b>	University Park (Ph.D., M.S., M.Eng.)
<b>Degrees Conferred</b>	Doctor of Philosophy (Ph.D.) Master of Science (M.S.) Master of Engineering (M.Eng.) Dual-Title Ph.D. in Environmental Engineering and Biogeochemistry
<b>The Graduate Faculty</b>	View ( <a href="https://secure.gradsch.psu.edu/gpms/?searchType=fac&amp;prog=ENV_E">https://secure.gradsch.psu.edu/gpms/?searchType=fac&amp;prog=ENV_E</a> )

This specialty prepares students for careers in:

- the design of treatment facilities,
- environmental monitoring,
- process development for water quality control,
- industrial waste treatment,
- management of hazardous and toxic substances,
- monitoring and management of environmental quality,
- air pollution control,
- and water resource systems.

## Admission Requirements

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

Applicants should possess a baccalaureate degree from a regionally accredited institution. Students in engineering, physical sciences, or mathematics with a 3.00 grade-point average (on a 4.00 scale) may be considered for admission. Exceptions to the minimum 3.00 grade-point average may be made for students with special backgrounds, abilities, and interests. Students without a baccalaureate degree in engineering would be admitted on a provisional basis (<http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-300/provisional-admission/>) pending successful completion of entrance requirements (completed concurrently with degree requirements).

All applicants must submit official transcripts from all post-secondary institutions attended (<http://www.gradschool.psu.edu/prospective-students/how-to-apply/new-applicants/requirements-for-graduate-admission/>), a statement of objectives, and three references for letters of recommendation when applying to the program. Submission of GRE scores is recommended but not required. For the M.Eng. degree, the recommendation for GRE scores is waived for students who have graduated with a degree from the College of Engineering at The Pennsylvania State University with a cumulative grade-point average of greater than 3.30.

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

(<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-300/gcac-305-admission-requirements-international-students/>) for more information.

## Application Deadlines

M.Eng.: Complete applications including required supplementary materials (e.g., official transcripts, reference letters) should be submitted by June 1st of the calendar year for admission in Fall semester. International students are strongly encouraged to submit complete applications early to allow sufficient time for visa processing.

M.S. and Ph.D.: Complete applications including required supplementary materials (e.g., official transcripts, reference letters) should be submitted by September 15th for admission in Spring semester and by December 15th for admission in Fall semester. International students are strongly encouraged to submit complete applications early to allow sufficient time for visa processing.

## Degree Requirements

### Master of Engineering (M.Eng.)

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

The M.Eng. degree is a non-thesis professional master's degree. The program provides training for advanced professional practice. A minimum of 31 credits (400, 500, and 800 level) of course work are required. At least 18 credits must be earned in graduate courses (500 level). At least 12 credits must be earned in courses with the CE prefix. At least 20 credits must be earned at an established graduate campus of the University. All students are required to take CE 835 to fulfill the requirement for a culminating experience. Specific core courses are also required. All students are required to take the 1-credit CE 590 and complete all requirements for Scholarship and Research Integrity (SARI) training. The M.Eng. degree is designed as a two-semester master's degree program and students are required to start their degree in the Fall semester. The preferred plan of study is as follows:

- Fall semester: Fifteen credits of course work plus one credit of CE 590
- Spring semester: Fifteen credits of course work, including CE 835

Continuous registration is required for all M.S. and Ph.D. graduate students until the thesis (M.S.) or dissertation (Ph.D.) has been approved or course requirements have been satisfied (M.Eng.).

### Master of Science (M.S.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (<https://gradschool.psu.edu/graduate-education-policies/>)

The M.S. degree program is strongly oriented toward research. A thesis is required, and at least 6 credits of thesis research (CE 600 or CE 610) must be included in the student's academic course plan. A minimum of 31 credits (400, 500, 600, and 800 level) are required, of which 20 must be earned at an established graduate campus of the University. A minimum of 24 credits of course work are required. A minimum of 12 credits of course work (400 and 500 level) must be completed in the major (courses prefixed CE). At least 18 credits in the 500 and 600 levels, combined, must be included in the program. Specific core courses are also required. All students are required to take the 1-credit CE 590 and complete all requirements for Scholarship and Research Integrity (SARI) training.

Students are not permitted to count audited credits toward the minimum credits required for the degree.

Continuous registration is required for all M.S. and Ph.D. graduate students until the thesis (M.S.) or dissertation (Ph.D.) has been approved or course requirements have been satisfied (M.Eng.).

## Doctor of Philosophy (Ph.D.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (<https://gradschool.psu.edu/graduate-education-policies/>)

For the Ph.D. degree, a minimum of 21 credits of course work (400, 500, 600, and 800) is required beyond the M.S. degree, or 15 credits beyond the M.S. in Environmental Engineering from Penn State. Specific core courses are also required. All students are required to take the 1-credit CE 590 and complete all requirements for Scholarship and Research Integrity (SARI) training. Students are not permitted to count audited credits toward the minimum credits required for the degree. A candidate for the Ph.D. degree must pass the English proficiency and qualifying examinations, prepare and defend the dissertation proposal as part of the oral comprehensive examination, and pass the final oral examination (dissertation defense). Prior to completion of the Ph.D. program, the student must spend at least two consecutive semesters as a registered full-time student.

Continuous registration is required for all M.S. and Ph.D. graduate students until the thesis (M.S.) or dissertation (Ph.D.) has been approved or course requirements have been satisfied (M.Eng.).

## Dual-Titles

### Dual-title Ph.D. in Environmental Engineering and Biogeochemistry

Requirements listed here are in addition to requirements listed in GCAC-208 Dual-Title Graduate Degree Programs (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-200/gcac-208-dual-titles/>).

Graduate students with research and educational interests in biogeochemistry may apply to the Biogeochemistry dual-title degree program. Students must apply and be admitted to the graduate program in Environmental Engineering and The Graduate School before they can apply for admission to the dual-title degree program. After admission to their primary program, students must apply for admission to and meet the admissions requirements of the Biogeochemistry dual-title program. Refer to the Admission Requirements section of the Biogeochemistry Bulletin page (<http://bulletins.psu.edu/graduate/programs/majors/biogeochemistry/>). Doctoral students must be admitted into the dual-title degree program in Biogeochemistry prior to taking the qualifying examination in their primary graduate program.

Students in the Biogeochemistry Dual Title program are required to have two advisers from separate disciplines:

1. one individual serving as a primary adviser in their major degree program
2. and a secondary adviser in an area within a field covered by the dual-title program and a member of the Biogeochemistry faculty.

To qualify for the dual-title degree, students must satisfy the degree requirements for the degree they are enrolled in Environmental Engineering, listed in the Degree Requirements section. In addition,

students must complete the degree requirements for the dual-title in Biogeochemistry, listed on the Biogeochemistry Bulletin page (<http://bulletins.psu.edu/graduate/programs/majors/biogeochemistry/>).

All students must pass a qualifying examination that includes an assessment of their potential in the field of biogeochemistry. A single qualifying examination that includes biogeochemistry will be administered for admission into the student's Ph.D. program, as well as the biogeochemistry dual-title. The structure and timing of this exam will be determined jointly by the dual-title and major program. The qualifying examination committee for the dual-title Ph.D. degree will be composed of Graduate Faculty from Environmental Engineering and must include at least one Graduate Faculty member from the Biogeochemistry program. Faculty members who hold appointments in both programs' Graduate Faculty may serve in a combined role. Dual-title graduate degree students may require an additional semester to fulfill requirements for both areas of study and, therefore, the qualifying examination may be delayed one semester beyond the normal period allowable.

In addition to the general Graduate Council requirements for Ph.D. committees (<http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/phd-dissertation-committee-formation/>), the Ph.D. committee of an Environmental Engineering and Biogeochemistry dual-title Ph.D. student must include at least one member of the Biogeochemistry Graduate Faculty. Faculty members who hold appointments in both programs' Graduate Faculty may serve in a combined role. If the chair of the Ph.D. committee is not also a member of the Graduate Faculty in Biogeochemistry, the member of the committee representing Biogeochemistry must be appointed as co-chair. The Biogeochemistry representative on the student's Ph.D. committee will develop questions for and participate in the evaluation of the comprehensive examination.

Students in the dual-title program are required to write and orally defend a dissertation on a topic that is approved in advance by their Ph.D. committee and reflects their original research and education in Environmental Engineering and Biogeochemistry. Upon completion of the doctoral dissertation, the candidate must pass a final oral examination (the dissertation defense) to earn the Ph.D. degree. The dissertation must be accepted by the Ph.D. committee, the head of the graduate program, and the Graduate School.

## Minor

A graduate minor is available in any approved graduate major or dual-title program. The default requirements for a graduate minor are stated in Graduate Council policies listed under GCAC-600 Research Degree Policies (<https://gradschool.psu.edu/graduate-education-policies/>) and GCAC-700 Professional Degree Policies (<https://gradschool.psu.edu/graduate-education-policies/>), depending on the type of degree the student is pursuing:

- GCAC-611 Minor - Research Doctorate (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/gcac-611-minor-research-doctorate/>)
- GCAC-641 Minor - Research Master's (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/gcac-641-minor-research-masters/>)
- GCAC-709 Minor - Professional Doctorate (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-700/gcac-709-professional-doctoral-minor/>)

- GCAC-741 Minor - Professional Master's (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-700/gcac-741-masters-minor-professional/>)

## Student Aid

Graduate assistantships available to students in this program and other forms of student aid are described in the Tuition & Funding (<https://gradschool.psu.edu/graduate-funding/>) section of The Graduate School's website. Students on graduate assistantships must adhere to the course load limits (<https://gradschool.psu.edu/graduate-education-policies/gsad/gsad-900/gsad-901-graduate-assistants/>) set by The Graduate School.

International applicants who wish to be considered for a teaching assistantship must present an acceptable score (250-300 or 55-60) on the Test of Spoken English (TSE). The TSE can be taken in many countries, or at Penn State after arrival. The Department offers a number of graduate fellowships.

## 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.

Civil Engineering (CE) Course List (<https://bulletins.psu.edu/university-course-descriptions/graduate/ce/>)

## Learning Outcomes

### Master of Engineering (m.Eng.)

1. **KNOW:** Graduates will be able to demonstrate understanding of advanced core principles and methods from selected sub-fields of Environmental Engineering at a depth consistent with their course of study.
2. **APPLY/CREATE:** Graduates will be able to apply their knowledge of selected sub-fields of Environmental Engineering to design and evaluate engineering solutions.
3. **THINK:** Graduates will be able to analyze and synthesize knowledge within the field of Environmental Engineering to address a complex problem of practical relevance.
4. **COMMUNICATE:** Graduates will be able to demonstrate proficiency in oral and written communication appropriate to their discipline.
5. **PROFESSIONAL PRACTICE:** Graduates will be able to demonstrate an understanding of, and a commitment to, academic integrity and the standards for professional practice within Environmental Engineering.

### Master of Science (M.S.)

1. **KNOW:** Graduates will be able to demonstrate understanding of advanced core principles and methods from selected sub-fields of Environmental Engineering at a depth consistent with their course of study.
2. **APPLY/CREATE:** Graduates will be able to apply their knowledge of selected sub-fields of Environmental Engineering to design and evaluate engineering solutions.

3. **THINK:** Graduates will be able to analyze and synthesize knowledge within the field of Environmental Engineering to extend existing knowledge through a research-based culminating experience.
4. **COMMUNICATE:** Graduates will be able to demonstrate proficiency in oral and written communication appropriate to their discipline.
5. **PROFESSIONAL PRACTICE:** Graduates will be able to demonstrate an understanding of, and a commitment to, the standards for scholarship and research integrity within Environmental Engineering.

## Doctor of Philosophy (Ph.D.)

1. **KNOW:** Graduates will be able to demonstrate an understanding of advanced core principles and methods as well as modern research findings from selected sub-fields of Environmental Engineering at a depth appropriate for conceptualizing and conducting independent research.
2. **APPLY/CREATE:** Graduates will be able to apply their knowledge of selected sub-fields of Environmental Engineering in formulating and executing a research plan.
3. **THINK:** Graduates will be able to demonstrate the ability to analyze and synthesize appropriate literature, to critically review their work in the context of the literature, and to formulate and defend conclusions based on their research that represent new scholarly contributions.
4. **COMMUNICATE:** Graduates will be able to demonstrate high levels of proficiency in oral and written communication.
5. **PROFESSIONAL PRACTICE:** Graduates will be able to demonstrate an understanding of, and a commitment to, the standards for scholarship and research integrity.

## Contact

<b>Campus</b>	University Park
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