

# ELECTRICAL ENGINEERING (CAPITAL)

<b>Graduate Program Head</b>	Vahid Motevalli
<b>Program Code</b>	EE (M.Eng.); EENG (M.S.)
<b>Campus(es)</b>	Harrisburg (M.S.) World Campus (M.Eng.)
<b>Degrees Conferred</b>	Master of Science (M.S.) Master of Engineering (M.Eng.) Integrated B.S. in Electrical Engineering and M.S. in Electrical Engineering
<b>The Graduate Faculty</b>	View ( <a href="https://secure.gradsch.psu.edu/gpms/?searchType=fac&amp;prog=EENG">https://secure.gradsch.psu.edu/gpms/?searchType=fac&amp;prog=EENG</a> )

## 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/>).

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

A prospective graduate student in Electrical Engineering at Penn State Harrisburg must fulfill the admission requirements as set forth by Graduate Council, and have a bachelor of science degree in an electrical engineering program accredited by the Accreditation Board of Engineering and Technology (ABET), or the equivalent. An undergraduate cumulative grade-point average of 3.0 or better on a 4.0 scale is required for admission. Exceptions to this will be based on professional experience and other factors such as GRE scores. In addition, a student who does not meet the overall 3.0 grade-point average may be considered for admission if the student has a 3.0 junior/senior grade-point average. Up to 15 credits earned in three semesters or fewer, as a nondegree student, may be applied toward the master's degree, subject to restrictions outlined in GCAC-309 Transfer Credit (<http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-300/transfer-credit/>).

Those applying for admission as a Master of Engineering student without an electrical engineering degree may be admitted with the stipulation that deficiencies in background, if any, will be remedied early in the program and that these courses will be in addition to the required number of credits for the degree.

Applicants must submit the following:

- online Graduate School application (<http://gradschool.psu.edu/prospective-students/how-to-apply/>) and payment of the application fee
- official transcripts from all post-secondary institutions attended (<http://www.gradschool.psu.edu/prospective-students/how-to-apply/new-applicants/requirements-for-graduate-admission/>)
- test scores from the Graduate Record Examinations (GRE) (preferable, but not required)

- three (3) letters of reference, especially those from faculty who can evaluate academic potential
- a personal statement of technical interest, goals, and experience

**Test scores from the Graduate Record Examination (GRE) are required ONLY for those applicants indicating interest in an assistantship. Assistantships are only available to students in residence.**

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.

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

Admission into the Master of Science (M.S.) Electrical Engineering program will be granted only to candidates who demonstrate high potential for success in graduate studies.

Applicants should have undergraduate degrees in engineering or technology-related fields from an accredited university and must meet the admission requirements as set by Penn State's Graduate Council.

An undergraduate cumulative grade-point average of 3.0 or better on a 4.0 scale, and scores from the GRE are required for admission.

Applicants must submit the following:

- a completed Graduate School online application (<http://gradschool.psu.edu/prospective-students/how-to-apply/>) with the application fee
- official transcripts from all post-secondary institutions attended (<http://www.gradschool.psu.edu/prospective-students/how-to-apply/new-applicants/requirements-for-graduate-admission/>)
- three (3) letters of professional recommendations from individuals who can evaluate the applicant's potential
- a personal statement of technical interest, goals, and experience
- test scores from the Graduate Record Examination (GRE)
- statement of interest in graduate assistantship, if desired

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.

Completed International Application material must be submitted by the following deadlines:

- May 31 for the fall semester
- September 30 for the spring semester
- February 28 for the summer session

Applications received after these deadlines will be processed for the following semester.

## 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/>).

A total of 30 credits is required for a Master of Engineering degree, of which at least 21 must be taken through Penn State Harrisburg engineering graduate programs. Up to 9 credits of graduate work may be transferred from other institutions provided (a) credits are suitable for the particular engineering discipline, and (b) students have earned a grade of B or better, subject to restrictions outlined in GCAC-309 Transfer Credit (<http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-300/transfer-credit/>). At least 18 credits must be at the 500 level, which includes 3 credits of EE 594.

Students enrolled in the program for the Master of Engineering degree in Electrical Engineering must earn 9 credits in the required core courses (i.e., courses with the EE prefix).

Students must write a scholarly paper and present it before two faculty members. The paper, completed in EE 594, is intended to be a relatively short document that includes a relevant literature review on a selected research topic identified by the adviser and to be prepared in a prescribed format (e.g. as papers in IEEE Transactions).

Students must have a 3.00 grade-point average in both prescribed and supporting courses approved by the program to graduate. Students pursue the program on a part-time basis. A student may complete the program within two years, based on completion of two courses a semester.

### 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/>)

All graduate students in Electrical Engineering are required to adhere to the requirements of the Graduate Council. The requirements of the Graduate Council, however, are minimum requirements and the policies, procedures, and regulations listed below are additional and more specific for graduate students pursuing the M.S. in Electrical Engineering degree at Penn State Harrisburg. Advisers will call pertinent regulations to the attention of their advisees, but it should be understood that it is the student's personal responsibility to see that all requirements are satisfied.

The MSEE program at Penn State Harrisburg is structured into two areas of concentration to fully take advantage of the specialty areas represented in the EENG Graduate Faculty. The areas are Electronics-Electromagnetics-Optics (EEO) and Systems.

The program requires 31 credits, including:

- 24 course credits with at least 15 credits at the 500 level,
- one colloquium credit,
- and 6 thesis credits (600-level).

All students are required to take a 500-level analysis course (EMCH 524A) in addition to prescribed courses in one of the two concentration areas. The prescribed courses are intended to establish the fundamentals of the technical areas. To incorporate some breadth into the program, students are required to take at least one course in the second concentration area.

A maximum of three 400-level courses (9 credits) may be taken for the MSEE degree.

Original research, usually requiring at least two semesters of work (nominal 6 credits), is expected for a thesis. Students must write and submit a thesis. The thesis work should be an in-depth investigation intended to extend the state of knowledge in some specialty area. The thesis committee consists of three Graduate Faculty members, including the thesis adviser. For thesis guidelines and timelines, students are referred to the Penn State Graduate School web site (<http://gradschool.psu.edu/current-students/etd/>).

The EENG program has established a six-year time limit for completion of the M.S. degree. Any extension beyond six years requires the approval of the EENG program Graduate Faculty.

The student must maintain a minimum grade point average (GPA) of 3.00 or better on a 4.00 scale in 500- and 400-level courses listed on his/her Plan of Study.

Penn State Harrisburg's MSEE program is distinct and independent of the MSEE program offered at the University Park campus.

## Integrated Undergrad-Grad Programs

### Integrated B.S. in Electrical Engineering and M.S. in Electrical Engineering

This Integrated Undergraduate/Graduate (IUG) degree program combines the B.S. in Electrical Engineering with the M.A. in Electrical Engineering offered at the following campuses:

#### Undergraduate Degree

- Harrisburg

#### Graduate Degree

- Harrisburg

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

The Electrical Engineering program 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 and the Master of Science in Electrical Engineering. The ability to coordinate as well as concurrently pursue the two degree programs enables students to earn the two degrees in five years.

Students in the IUG program must satisfy the degree requirements for both Bachelor of Science and Master of Science degrees. However, the total course load is reduced due to the maximum of 12 credits that can count towards both degrees. A minimum of 7 credits proposed to count for both degrees must be at the 500 level. Thesis credits may not be double counted. The fourth year of the IUG program differs from the fourth year of the Bachelor of Science program due to the courses that count toward the Master of Science Degree requirements.

Student performance will be monitored on an on-going basis. In addition, a formal evaluation of student's academic performance will be conducted

at the end of the first semester of the senior year for a typical student in the program. Students who have not maintained a 3.4 GPA in their Math and Electrical Engineering courses will be put on probationary status with respect to the IUG program. Their ability to continue in the IUG program will be based on academic performance in the last semester of their senior year. As part of the review in the senior year, students will be advised about the thesis requirement in the graduate program.

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

### 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/>).

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 Electrical Engineering graduate program for the Master of Science degree, listed in the Admission Requirements section.

Students must submit:

- an official transcript
- three letters of professional recommendation from individuals who can evaluate the applicant's potential
- a personal statement of technical interest and goals

A faculty adviser will help undergraduate candidates determine a sequence of courses that will prepare them for acceptance into the Integrated Undergraduate-Graduate (IUG) degree program. In order to apply for this IUG program, students must have completed entrance to the undergraduate major and a minimum of 81 credits; therefore a typical student would apply after completing the fifth semester and before the end of the sixth semester. Students must be admitted no later than the end of the second week of the semester preceding the semester of expected conferral of the undergraduate degree. Transfer students must have completed at least 15 credits at Penn State to enroll in an IUG. For consideration for acceptance into the program, students must have cumulative grade point average (GPA) of 3.4 or better and collective GPA of 3.4 or better in the following courses:

Code	Title	Credits
CMPEN 271	Introduction to Digital Systems	3
CMPEN 275	Digital Design Laboratory	1
EE 315	Electrical Signals and Circuits with Lab (or equivalent)	5
EE 341	Semiconductor Device Principles	3
CMPEH 472	Microprocessors	4
And all the designated MATH, PHYS, and CMPSC courses		

Applications will be evaluated based on students' overall academic performance, in addition to the above requirements. In all cases,

admission to the program will be at the discretion of the Graduate Admissions Committee of the Electrical Engineering program.

### Degree Requirements

Students must fulfill all degree requirements for each degree in order to be awarded that degree, subject to the double-counting of credits as outlined below. Degree requirements for the Bachelor of Science in Electrical Engineering are listed in the Undergraduate Bulletin (<http://bulletins.psu.edu/undergraduate/>). Degree requirements for the Master of Science in Electrical Engineering degree are listed on the Degree Requirements tab. Students must sequence their courses so all undergraduate degree requirements are fulfilled before taking courses to count solely towards the graduate degree. Students are expected to complete the undergraduate degree requirements within the typical time to degree for the undergraduate major. In the semester in which the undergraduate degree requirements will be completed, IUG students must apply to graduate, and the undergraduate degree should be conferred at the next appropriate Commencement.

Up to 12 credits may be double-counted towards the degree requirements for both the graduate and undergraduate degrees; a minimum of 50% of the double-counted courses must be at the 500 or 800 level. Independent study courses and credits associated with the culminating experience for the graduate degree cannot be double-counted.

The EENG program has established a six-year time limit for completion of the M.S. degree. Any extension beyond six years requires the approval of the EENG program's Graduate Faculty.

Students must maintain a minimum grade point average (GPA) of 3.00 or better on a 4.00 scale in 500- and 400-level courses listed on their Plan of Study.

### 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.

World Campus students in graduate degree programs may be eligible for financial aid. Refer to the Tuition and Financial Aid section (<https://www.worldcampus.psu.edu/tuition-and-financial-aid/>) of the World Campus website for more information.

## 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.

Electrical Engineering (EE) Course List (<https://bulletins.psu.edu/university-course-descriptions/graduate/ee/>)

## Learning Outcomes

1. **KNOW.** Graduates will be able to demonstrate broad mastery of core principles in electrical engineering as well as in-depth mastery in selected electrical engineering topics.
2. **CRITICAL THINKING.** Graduates will be able to critically and creatively conceptualize, evaluate and formulate electrical engineering problems, as well as perform the analyses required for problem definition.
3. **PROBLEM SOLVING.** Graduates will be able to apply advanced knowledge, techniques, skills and state of the practice tools to solve electrical engineering problems.
4. **COMMUNICATE.** Graduates will be able to effectively communicate, both orally and in writing, project outcomes, such as ideas, requirements, designs, analyses, findings, and justification for decisions.
5. **ETHICS AND PROFESSIONALISM.** Graduates will be able to demonstrate an understanding of professional and ethical responsibility and conduct themselves accordingly.

## Contact

<b>Campus</b>	Harrisburg
<b>Graduate Program Head</b>	Vahid Motevalli
<b>Director of Graduate Studies (DGS) or Professor-in-Charge (PIC)</b>	Rafic A Bachnak
<b>Program Contact</b>	Kelly Batche W256 Olmsted 777 West Harrisburg Pike Middletown PA 17057 klb68@psu.edu (717) 948-4349
<b>Program Website</b>	View ( <a href="https://harrisburg.psu.edu/science-engineering-technology/ee-eet/master-electrical-engineering-msee/">https://harrisburg.psu.edu/science-engineering-technology/ee-eet/master-electrical-engineering-msee/</a> )

<b>Campus</b>	World Campus
<b>Graduate Program Head</b>	Vahid Motevalli
<b>Director of Graduate Studies (DGS) or Professor-in-Charge (PIC)</b>	Robert A. Gray
<b>Program Contact</b>	Kelly Batche W256 Olmsted - Penn State Harrisburg 777 W. Harrisburg Pike Middletown PA 17057 klb68@psu.edu (717) 948-4349
<b>Program Website</b>	View ( <a href="http://www.worldcampus.psu.edu/degrees-and-certificates/penn-state-online-electrical-engineering-masters-degree/overview/">http://www.worldcampus.psu.edu/degrees-and-certificates/penn-state-online-electrical-engineering-masters-degree/overview/</a> )