

ENGINEERING, DOCTOR OF PHILOSOPHY (PH.D.)

Note: Admission to this program is temporarily suspended.

Program goal

The goal of the Ph.D. in Engineering degree program is to provide graduate students with learning opportunities for acquiring a broad foundation of engineering knowledge; an in-depth original research experience at the frontiers of engineering; and skills for lifelong learning and professional development. Graduates of this program will pursue careers in research and development or academia.

1. **Advanced research skills:** To produce graduates who possess the necessary advanced analytical, technical and research skills in engineering and the sciences in order to respond directly to the higher goal of fulfilling the needs of industry, academe and research laboratories for effective, productive engineers, professors and researchers
2. **Communication:** To produce graduates who possess a facility with both written and oral communications so that engineers, researchers and professors will be able to interact and share ideas with others in the work environment, and at a higher level, be capable of creative self-expression, conveying knowledge and leadership
3. **Advanced problem-solving:** To produce graduates who demonstrate creativity and innovation in solving technological problems stemming from the realization that new knowledge and new solutions to existing problems are necessary to meet the needs of our changing society and to advance the quality of human life

Student learning outcomes

Graduates of the Ph.D. in Engineering degree program will be able to demonstrate:

1. The ability to apply advanced knowledge of mathematics, science or engineering
2. The ability to communicate effectively
3. The ability to identify, formulate and solve engineering problems
4. The ability to identify pertinent research problems, to formulate and execute a research plan, to generate and analyze research results, and to communicate those results through oral presentations and written publications. Graduates will be able to creatively solve the research problems posed.

VCU Graduate Bulletin, VCU Graduate School and general academic policies and regulations for all graduate students in all graduate programs

The VCU Graduate Bulletin website documents the official admission and academic rules and regulations that govern graduate education for all graduate programs at the university. These policies are established by the graduate faculty of the university through their elected representatives to the University Graduate Council.

It is the responsibility of all graduate students, both on- and off-campus, to be familiar with the VCU Graduate Bulletin as well as the Graduate School website (<http://www.graduate.vcu.edu/>) and academic

regulations in individual school and department publications and on program websites. However, in all cases, the official policies and procedures of the University Graduate Council, as published on the VCU Graduate Bulletin and Graduate School websites, take precedence over individual program policies and guidelines.

Visit the academic regulations section for additional information on academic regulations for graduate students. (<http://bulletin.vcu.edu/academic-regs/>)

Degree candidacy requirements

A graduate student admitted to a program or concentration requiring a final research project, work of art, thesis or dissertation, must qualify for continuing master's or doctoral status according to the degree candidacy requirements of the student's graduate program. Admission to degree candidacy, if applicable, is a formal statement by the graduate student's faculty regarding the student's academic achievements and the student's readiness to proceed to the final research phase of the degree program.

Graduate students and program directors should refer to the following degree candidacy policy as published in the VCU Graduate Bulletin for complete information and instructions.

Visit the academic regulations section for additional information on degree candidacy requirements. (<http://bulletin.vcu.edu/academic-regs/grad/candidacy/>)

Graduation requirements

As graduate students approach the end of their academic programs and the final semester of matriculation, they must make formal application to graduate. No degrees will be conferred until the application to graduate has been finalized.

Graduate students and program directors should refer to the following graduation requirements as published in the Graduate Bulletin for a complete list of instructions and a graduation checklist.

Visit the academic regulations section for additional information on graduation requirements. (<http://bulletin.vcu.edu/academic-regs/grad/graduation-info/>)

Other information

Student handbook (<http://www.egr.vcu.edu/current-students/graduate-student-services/resources-forms/>) is available on the College of Engineering website.

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Admission requirements

Degree:	Semester(s) of entry:	Deadline dates:	Test requirements:
Ph.D.	Fall	Jun 1 (Feb 15 for financial assistance)	GRE-General
	Spring	Nov 15	TOEFL required for international students

Special requirements

Students may begin a course of study in either the fall or spring semesters for the engineering programs, although a start in the fall semester is preferred.

In addition to the general admission requirements of the VCU Graduate School (<http://bulletin.vcu.edu/graduate/study/admission-graduate-study/admission-requirements/>) and the College of Engineering, applicants to the doctoral degree in engineering must have a B.S. degree in engineering or a closely related discipline.

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Degree requirements

In addition to the VCU Graduate School graduation requirements (<http://bulletin.vcu.edu/academic-regs/grad/graduation-info/>), students entering the doctoral program with a B.S. degree, but not the M.S., will require a minimum of 60 post-baccalaureate credit hours beyond the bachelor's degree, including research credit hours (30 for M.S. level and an additional 30 for Ph.D. level).

Students holding the master's degree must complete a minimum of six credit hours in concentration course work, three credit hours in elective course work and 21 credit hours in dissertation research. The student's adviser must approve all course work. Ph.D. students must take a minimum of 30 credit hours (including research credit hours) beyond the master's degree. At least half of the credit hours required in the student's program must be those designated as exclusively for graduate students, that is, those at the 600 level or above.

A minimum of three years of study, including research, is necessary to complete all requirements for the Ph.D. A period of residence of at least three consecutive semesters is required. Residency is defined as registration for at least nine credit hours per semester. Students have a maximum of eight calendar years, beginning at the time of first registration to complete the Ph.D. degree program.

Comprehensive examinations

In order to advance to doctoral candidacy, the student must pass both written and oral comprehensive examinations. The written examination focuses on the subject matter deemed critical as a foundation in the program. The examination is largely based on material covered in required course work and its application to theoretical and practical problems. The oral examination, which follows successful completion of the written examination(s), is administered to assess the ability of the student to integrate information and display an appropriate mastery of problem-solving capabilities. Graduate students may not take the comprehensive exam if their overall GPA is less than 3.0. Students must also have a minimum GPA of 3.0 for courses within the program in order to take the comprehensive exam. For further details, see the graduate program director or the program chair.

Admission to degree candidacy

Before admission to doctoral candidacy, students must have:

1. Completed required course work
2. Successfully completed the comprehensive examinations
3. Fulfilled all additional departmental requirements

A student may seek admission to candidacy for the Doctor of Philosophy degree without first completing the research and thesis portion of the Master of Science degree.

Dissertation research

The student must conduct a substantial original investigation under the supervision of the permanent adviser and prepare a dissertation reporting the results of this research and analyzing its significance in relation to existing scientific knowledge.

When the dissertation has been completed, copies in accepted form and style are submitted to the members of the advisory committee. The committee members decide upon the acceptability of the candidate's dissertation. A favorable unanimous vote is required to approve the dissertation and all examiners are required to vote.

If the advisory committee accepts the dissertation for defense, the candidate appears before them for a final oral examination. This examination is open to all members of the faculty. The final oral examination will be limited to the subject of the candidate's dissertation and related matters. A favorable vote of the candidate's advisory committee and no more than one negative vote shall be required for passing the final oral examination. All committee members must vote. There shall be an announcement of the candidate's name, department and title of dissertation, together with the day, place and hour of the final oral examination at least 10 working days in advance.

There are three components of each Ph.D. in Engineering curriculum:

1. Concentration-specific component: This component allows the student to pursue a series of courses that focus on a specific field of engineering and serve as the student's primary engineering discipline.
2. Electives component: This component allows the student to take courses in either engineering or science with approval of the student's adviser.
3. Directed research component: This component emphasizes research directed toward completion of degree requirements under the direction of an adviser and advisory committee.

Curriculum requirements

M.S. to Ph.D. in Engineering

Course	Title	Hours
Concentration-specific component: ENGR course work		6
Electives: engineering or science course work		3
ENGR 697	Directed Research	21
Total Hours		30

Total graduate credit hours required (minimum) 30

B.S. to Ph.D. in Engineering

Course	Title	Hours
Concentration-specific component: ENGR course work		18
Electives: engineering or science course work		15
ENGR 697	Directed Research	27
Total Hours		60

The minimum total of graduate credit hours required for this degree is 60.

Contact

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Program website: egr.vcu.edu/future-students/graduate-programs
(<http://www.egr.vcu.edu/future-students/graduate-programs/>)