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Department of Engineering Education 2023–2024 Graduate Manual

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COLLEGE OF ENGINEERING
ENGINEERING EDUCATION
VIRGINIA TECH™

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ENGINEERING EDUCATION GRADUATE PROGRAMS

Our Mission: Preparing scholars to advance knowledge and address significant challenges facing engineering education.

The Virginia Tech Department of Engineering Education (ENGE) offers a Doctor of Philosophy (PhD) Degree in engineering education and a Graduate Certificate in engineering education. ENGE graduate programs are ideal for students who are interested in becoming leaders in innovation and catalysts for change in society through engineering education. The programs strive to prepare students who are interested in a variety of professional paths, including students who wish to pursue engineering faculty positions in universities of all types; students who wish to pursue careers in policy; and students with a strong interest in educational research, corporate training management, university assessment, or university administration. The inherent flexibility of the programs allow students to tailor their curriculum and research to prepare them to achieve their goals in engineering education.

Virginia Tech Principles of Community

Virginia Tech is a public land grant University, committed to teaching and learning, research, and outreach to the Commonwealth of Virginia, the nation, and the world community. Learning from the experiences that shape Virginia Tech as an institution, we acknowledge those aspects of our legacy that reflected bias and exclusion. Therefore, we adopt and practice the following principles as fundamental to our ongoing efforts to increase access and inclusion and to create a community that nurtures learning and growth for all of its members:

- We affirm the inherent dignity and value of every person and strive to maintain a climate for work and learning based on mutual respect and understanding.
- We affirm the right of each person to express thoughts and opinions freely. We encourage open expression within a climate of civility, sensitivity, and mutual respect.
- We affirm the value of human diversity because it enriches our lives and the University. We acknowledge and respect our differences while affirming our common humanity.
- We reject all forms of prejudice and discrimination, including those based on age, color, disability, gender, national origin, political affiliation, race, religion, sexual orientation, and veteran status. We take individual and collective responsibility for helping to eliminate bias and discrimination and for increasing our own understanding of these issues through education, training, and interaction with others.
- We pledge our collective commitment to these principles in the spirit of the Virginia Tech motto of Ut Prosim (That I May Serve).

Purpose of the Graduate Manual

The Graduate Manual provides a detailed description of the requirements for all graduate programs offered by the Department of Engineering Education as well as descriptions of the procedures for completing the requirements of each program. Additional information concerning Graduate School requirements may be found in the Virginia Tech Graduate Policies and Procedures and Course Catalog: http://graduateschool.vt.edu/graduate_catalog/

If there is any doubt regarding the interpretation of any regulation or requirement in this manual, or if there are questions about the graduate program involving matters not covered in this manual, please consult with the Assistant Department Head (ADH) for Graduate Programs.

This manual includes the requirements, policies, and procedures adopted by ENGE for successful completion of graduate programs. The requirements set forth herein apply only to graduate programs in ENGE. The Virginia Tech Graduate School has established further and separate requirements, and ENGE graduate students must meet the requirements of both the Graduate School and the ENGE Department for successful degree completion. While Graduate School requirements may be mentioned occasionally in this document, students should consult the Graduate Policies and Procedures and Course Catalog for a complete description of those requirements.

The requirements, policies, and procedures set forth herein apply to students joining an ENGE Graduate Program on or after Fall Semester 2023. It is the responsibility of each graduate student to understand and adhere to all applicable policies, procedures, and requirements included in the Graduate Manual.

The provisions of this manual do not constitute a contract, expressed or implied, between any applicant or student and the ENGE Department or Virginia Polytechnic Institute and State University. The University and the ENGE Department reserve the right to change any of the provisions, schedules, programs, courses, rules, regulations, or fees whenever University or departmental authorities deem it expedient to do so.

Administration of ENGE Graduate Programs

The ADH for Graduate Programs and ENGE Graduate Committee develop all requirements, policies, and procedures for the ENGE Graduate Programs with input from students and faculty.

The Academic Programs Manager serves as administrative assistant to the Graduate Programs, maintains all files for the graduate programs, is the source of information on the graduate programs including but not limited to: forms for carrying out graduate programs and Graduate School requirements, course registration, application for admission and financial aid, grade changes, and other routine paperwork relating to the graduate program. Additionally, the Academic Programs Manager works on marketing for the department both internally and externally.

The administrative staff of the graduate program of the ENGE Department includes:

Department Head:	Dr. Jennifer Case 540.231.6555 / jencase@vt.edu
ADH for Graduate Programs:	Dr. Walter Lee 540.231.3234 / walterl@vt.edu
Academic Programs Manager:	Tamara “Mara” Knott 540.231.9543 / knott@vt.edu

APPLYING TO THE PhD PROGRAM

Application for Admission to the ENGE PhD Program

To expedite the application process, online applications are required. Complete applications include:

- Application for admission to the Graduate School
- Three letters of recommendation
- A statement of purpose and research interests (~1000 word limit) for graduate study
- Official transcript(s) — can be either scanned official transcript(s) or electronic official transcripts provided by the institution's Registrar; original transcripts are required upon enrollment
- TOEFL (Test of English as a Foreign Language) or IELTS (International English Language Testing System) scores for students whose first language is not English. (Note: English proficiency can also be demonstrated through a conferred bachelor's degree from an accredited university where English is the medium of instruction.)

The application for admission to the Graduate School should indicate the semester and year for which the student is applying for admission.

Applicants can begin the online application process at:
https://graduateschool.vt.edu/admissions/how-to-apply.html

TOEFL or IELTS scores (if applicable) AND unofficial transcripts must be received by the Graduate School before the application is considered complete. Unofficial transcripts are required even for applicants holding other degrees from Virginia Tech.

Graduate Student Orientation

Prior to the start of each semester, the ENGE Department conducts a mandatory orientation to the Department and the graduate program for new graduate students. This orientation provides new students with a review of ENGE graduate program requirements, procedures for fulfilling those requirements, guidance on interacting with their tentative advisor, selecting a faculty advisor, the graduate honor system, and other topics of importance to new students. Additional orientation sessions may continue throughout the Fall semester and will be scheduled as needed.

The dates of the ENGE Department PhD student orientation are coordinated with other training activities to avoid conflicts. For students serving as teaching assistants, additional Department and University training is also required. Teaching assistants must be on campus for training beginning August 10. Students serving as research assistants should contact their research supervisor to determine if any additional training is required for their position.

FUNDING PRACTICES AND OPPORTUNITIES

Financial Assistance

The ENGE Department offers financial assistance for qualified graduate students in the form of graduate teaching assistantships (GTA) and graduate research assistantships (GRA); students must apply before the application deadline to be given full consideration for Fall funding. Additional fellowships are also available through the College of Engineering and the Graduate School; students are notified on a case-by-case basis when the Department is asked to make nominations for those fellowships.

All assistantships carry a waiver of tuition, except those awarded during summer terms. **The minimum departmental funding rates for stipends is Step 13;** and increases will abide with the following schedule (pending positive reviews from supervisors, see Continuing an Assistantship section for a description of the satisfactory/unsatisfactory decision process):

- First 4 semesters as GRA/GTA/Internal Fellowship in ENGE: Middle of Minimum Step
- Semesters 5-6 as GRA/GTA/Internal Fellowship in ENGE: Top of Minimum Step
- Semesters 7+ as GRA/GTA/Internal Fellowship in ENGE: Middle of Step Above Minimum
    - Note: must be a PhD candidate at the start of the semester for this rate (i.e., passed the preliminary exam)

In addition to tuition, the following fees are charged for enrollment. (These are estimated fees, based on 2022-23 Academic Year, and should be verified by visiting the Bursar's website.):

Engineering, Library, and Technology Fee - $1092.50

Comprehensive Fees (Student Activity Student Cultural Activities, Health, Athletic, Transportation Services, Recreation Sports, Student Service) - $1188.00

Commonwealth Facility & Equipment Fee (non-Virginia Residents only) - $302.00

Students are responsible for paying the Comprehensive fees and the Commonwealth Facility & Equipment fee. For students on assistantship, these fees can be paid via a payment plan available through the Bursar's office. The Engineering, Library, and Technology Fees for students on assistantship are paid by the department.

Student Health Care

All full-time graduate students are required to pay a health-service fee. The Health Services Office provides limited medical care in the infirmary (Schiffert Health Center) for all students when the university is in session and for those students who are required to work between terms. Persons are not eligible for health services when they are not registered. The fee does not provide health services for the student's family. Students who maintain 50-100% assistantship appointments and who have purchased the university-sponsored health care plan are eligible to receive a contribution towards their health insurance premiums. Visit here for more information: https://graduateschool.vt.edu/student-life/student-services/health-services.html

International students are required to have insurance for themselves and all dependents. The insurance policy can be obtained through the university or through private U.S. and foreign

insurance companies.

Students must report immediately to the Department Head any accident or injury occurring while they are on university business or related travel so it may be documented appropriately.

Assistantship Expectations

A student who is supported by a full-time GTA is contracted for 20 hours of work per week throughout the semester for which the award applies. Typically a GTA is assigned to teach in the first-year engineering program. GTA offers should include general information about expectations for the period of performance. Specific expectations will be communicated via writing once a GTA is matched with a specific instructor at the start of the semester.

A student receiving a full-time GRA is contracted for 20 hours of work per week during the semester for which the award applies; the principal investigator will assign duties, including expectations around contract start dates (typically August 10). GRA offers should include general information about expectations for ongoing funding and advising relationships. Specific expectations should be communicated via writing at the start of the semester.

Students holding a full-time assistantship must be registered for at least 12 credit hours per semester, and not more than 18 hours. Until a student passes the qualifying exam, if funded on a GTA, they must be registered for at least one course unless receiving permission from the ADH for Graduate Programs. Students holding less than full-time GTAs or GRAs receive a proportionally smaller stipend and reduced tuition waiver and carry a proportionally lower workload.

Graduate School policies govern whether accepting additional employment is allowed:

> Graduate students on full assistantships are not prohibited from seeking additional employment (some restrictions apply: assistantships cannot be combined with P14 appointments; immigration regulations further govern international student employment). Students should consult with their academic advisor and/or assistantship supervisor as applicable regarding the fulfillment of their assistantship and graduate study responsibilities. Students must notify the Graduate School about any additional employment, including the period of employment, name and contact of employer, and job title or short description of duties.
>
> https://graduateschool.vt.edu/funding/types-of-funding/assistantships.html

The duties of a student supported by a fellowship depend on the particular fellowship and are not covered in this manual.

Requesting a GTA

The timeline for requesting departmental assistantships on the full academic year basis is:

- Students request GTA support for upcoming academic year by responding to a departmental survey around April 1
- Departmental decisions in response to these requests are made around April 15

    - Students have 2 weeks from when a position is offered to accept and a non-response is considered a decline
- Department formalizes these decisions around May 10

Note: The timeline for requesting departmental assistantships for a Spring semester is determined on an ad hoc basis.

Requesting a GRA

GRA appointments are made to support research projects that are supervised by ENGE faculty; hence, the principal investigators for the research project are responsible for selecting students for a GRA and establishing the timeline for doing so. Students who are interested in requesting a GRA should contact faculty members directly.

Changing From a GTA/GA to GRA After Signing a Contract

Should a student receive an offer of funding from an alternate source after accepting/signing the official ENGE GTA contract, they may give up the GTA contract according to the following timeline:

- Fall GTA contracts may be given up for another contract before **July 20**. (Note: If the GTA contract was for the full AY, the Spring GTA contract is also terminated).
- Spring GTA contracts may be given up for another contract up to **three weeks (21 days) before the end of the Fall semester classes**.

Beyond the specified times, a GTA may be vacated in favor of another contract only with the consent of the ADH for Graduate Programs and the ADH for Undergraduate Programs. One consideration in the decision is the availability of qualified graduate students to fill the vacated GTA position. Students may appeal decisions by the ADHs with the Department Head.

Continuing an Assistantship

Continued assistantship support is competitive and dependent upon funding available to the Department. For students pursuing a PhD, the terms of a GTA or GRA are contingent on satisfactory academic progress, satisfactory performance of GTA or GRA duties, and professional and personal conduct. Students are typically awarded two years of support upon admission. After two years, funding is not guaranteed, unless otherwise noted in a memorandum of understanding issued to a student. However, preference will be given to ENGE students over non-ENGE students for GTAs pending performance reviews. Requests for renewal of assistantships will be considered along with new applications each semester.

The process for reviewing assistantship performance and re-issuing a graduate assistantship contract is as follows:

- Students on an assistantship (GTA or GRA) funded through the ENGE department must complete a performance review with their supervisor(s) (i.e., faculty members working directly with students). Students are responsible to upload the completed review form to Canvas by the posted deadline each semester. Any questions or delays impacting this timeline should be brought to the Graduate ADH's attention promptly.
- Following each semester, both the Graduate and Undergraduate ADHs go through the ENGE PhD roster and determine satisfactory or unsatisfactory, using review forms as a primary data point (supplemented with meetings if needed).

- If unsatisfactory, that review serves as the documented warning that improvement is needed, unless the student already received a warning a prior semester.
- If the student already had a documented performance improvement plan, the student will no longer receive departmental funding (i.e., GTA), regardless of stage in the program.

Students may appeal decisions by the ADHs with the Department Head. Students who wish to appeal the DH decision may take that appeal through the university HR process.

ACADEMIC POLICIES

GPA Requirement

Students must obtain a 3.00 GPA, both overall and for courses on the Plan of Study. All courses on the approved plan, including supporting courses, must be completed with a grade of "C-" or better.

Annual Review of Progress

An Annual Review of Progress happens in accordance with requirements of graduate programs and dissertation committees. Though there is no set timeline for completing the ENGE doctoral program, the annual review does evaluate progress towards degree and significant unexplained delays or unsatisfactory performance on ENGE 7994 Research/Dissertation hours may eventually result in denial to continue in the degree program in accordance with Graduate School policy. The specific policy is copied below or can be found at the following link: https://secure.graduateschool.vt.edu/graduate_catalog/policies.htm?policy=002d14432c654287012c6542e38200ad

> All graduate students are required to have an Annual Review of Progress at least once a year by their Advisory Committees. Students who do not yet have a Plan of Study and an Advisory Committee should be reviewed by the Graduate Program Director [i.e., ADH for Graduate Programs] or a departmental Graduate Committee. If a student fails to make satisfactory progress toward degree requirements (coursework, grades, research, projects, examinations, and other requirements), permission may be denied to continue in the degree program. This decision may be reached by the student's Advisory Committee, a graduate program Evaluation Committee in the department and the Graduate Program Director, or the Department Head, and recommended to the Graduate School. The Graduate School will dismiss the student for unsatisfactory progress following the recommendation by the department. The departmental recommendation should include documentation of at least one review indicating unsatisfactory progress, communication to the student about what was needed to reestablish satisfactory progress, and evidence that the student's progress continued to be unsatisfactory (second review).

Academic Probation

Any student with a cumulative grade point average below 3.00 for their prior semester of graduate work or whose review indicates that satisfactory progress is not being met may be placed on academic probation and may be required to appear before the Graduate Committee. Formal communication is necessary when an annual academic progress review notes that satisfactory progress is not being met. This formal communication involves a letter written collaboratively between the student's advisor(s) and the ADH of Graduate programs (on behalf

of the ENGE Graduate Program), which highlights the specific issues and a clearly documented path for the student to demonstrate improvement. In accordance with Graduate School and ENGE Departmental policy, any student who fails to meet requirements to demonstrate improvement and resume satisfactory academic progress typically will be dismissed from the ENGE graduate program.

Students may receive an "incomplete" in a course for a variety of reasons. If the "incomplete" is in a course that appears on the student's Plan of Study and it is not resolved by the last day of classes of the next semester in which the student is enrolled, the student will be placed on academic probation and may be required to meet with the Graduate Committee. The purpose of this appearance is to discover the source of the difficulties and to outline adjustments that the student should pursue for improvement. Two successive semesters on probation will typically result in the student being dismissed from the ENGE graduate program. The student's advisor will be consulted at all stages in the process.

Start of Semester Defense Exception (SSDE)

Start of Semester Defense Exception (SSDE) is a special enrollment category for students who have fulfilled all degree requirements and are registering only to take the final oral examination. There are exceptions and procedures for being allowed to enroll in SSDE that can be found on the Graduate School website.

Continuous Enrollment

The Commission on Graduate Studies & Policies and University Council approved a resolution (2014-15H) that requires graduate students to be continuously enrolled for a minimum of three credit hours in all Spring and Fall semesters at the University from the time of initial matriculation in the degree program until graduation. There are exceptions and procedures for taking a Leave of Absence that can be found here: https://secure.graduateschool.vt.edu/graduate_catalog/policies.htm?policy=002d14432c654287012c6542e382008c

Scholarly Ethics and Integrity

Academic integrity is essential for maintaining the quality of scholarship in the Department and for protecting those who depend on the results of research performed by faculty and students. The faculty of the Department of Engineering Education expects all students to maintain academic integrity at all times in the classroom and in research and to conduct academic work in accordance with the high ethical standards of the profession. Students are expected to maintain academic integrity by refraining from academic dishonesty and conduct that aids others in academic dishonesty or that leads to suspicion of academic dishonesty.

The Graduate Honor Code establishes a standard of academic integrity and demands a firm adherence to a set of values. In particular, the code is founded on the concept of honesty with respect to the intellectual efforts of oneself and others. Compliance with the Graduate Honor Code requires that all graduate students exercise honesty and ethical behavior in all of their academic pursuits at Virginia Tech, whether these undertakings pertain to study, course work, research, extension, or teaching. Details on the Graduate Honor Code can be found on the Graduate School website.

The term “ethical behavior” is defined as conforming to accepted professional standards of conduct, such as codes of ethics used by professional societies in the United States to regulate the manner in which their professions are practiced. The knowledge and practice of ethical behavior shall be the full responsibility of the student. Graduate students may, however, consult with their advisors, Department Head, the international students office, or the Graduate School for further information on expectations and definitions.

All graduate students while being affiliated with Virginia Tech shall abide by the standards established by Virginia Tech, as described in the Graduate Honor System Constitution. Graduate students, in accepting admission, indicate their willingness to subscribe to and be governed by the Graduate Honor Code and acknowledge the right of the University to establish policies and procedures and to take disciplinary action (including suspension or expulsion) when such action is warranted. Ignorance shall be no excuse for actions that violate the integrity of the academic community.

In all written work completed for ENGE course and degree program requirements, students should be sure to cite sources of ideas and clearly identify direct quotes. To avoid plagiarism, students should use norms for citing direct quotes around any strings of text longer than three words that are directly copied from any other source.

Retention of State Property

When students leave the university for any reason, they must return all property belonging to the Commonwealth of Virginia to their faculty supervisor or other appropriate persons. It is unlawful to remove from the university campus any property that was purchased with state funds or sponsored research funds or developed while employed by Virginia Tech in any category. Some examples of items that cannot be taken away or destroyed are door keys, computer programs, laptops, books, original drawings and figures for research reports, and video or camera equipment.

The student and their advisor, mentor, supervisor, or the ADH for Graduate Programs should determine ownership of data and make arrangements for appropriate access. Students should recognize that they do not retain ownership over or responsibility for data collected for sponsored research.

ENGINEERING EDUCATION PhD PROGRAM

Goals and Objectives

The ENGE PhD program develops diverse scholars who are dedicated to improving engineering education and practice. Students in the PhD program are trained to conduct engineering education research, understand contextual influences, and translate research to practice.

The learning outcomes graduates are expected to demonstrate include the ability to:

- Identify significant challenges facing engineering education
- Design, conduct, and critique engineering education research
- Understand relationships between sociocultural influences and engineering education & practice
- Translate education research to practice
- Communicate the implications of engineering education research to various stakeholders
- Design and critique assessment plans for engineering-related courses and programs
- Apply pedagogical practices to engineering-related content

Coursework Requirements

An ENGE PhD requires a minimum of 90 total credits beyond the Bachelor's degree, with the program of study subject to approval by student's advisory committee:

- *Eight (8) Credits of Engineering Education Qualifying Courses:*
  ENGE 5214: Issues in Engineering Education (2 credits)
  ENGE 5224: Disciplinary Literacy: Theorizing and Writing in Engineering Education (3 credits)
  ENGE 5604: Engineering Education Research Methods (3 credits)

  Guidelines: Qualifying courses must be completed prior to sitting for the qualifying exam. The purpose of these courses is to ensure that students have sufficiently made the adjustment to social science and that they can communicate within and understand the field of engineering education as it relates to: (1) theoretical concepts, (2) applied issues, and (3) means of inquiry for undertaking research.

- *Three Credits of Practical Applications*
  - **ENGE 5514:** Applied Design and Assessment of Engineering Educations Experiences (3 credits)

  Guidelines: The purpose of these credits is to ensure students can transfer their foundational knowledge (i.e., theory or conceptual knowledge) to actual work, emphasizing the importance of learning by doing. This course should be taken after the successful completion of the qualifying exam.

- *Five (5) Credits of Seminar Courses:*
  ENGE 5304: Graduate Student Success in Multicultural Environments (1 credit)
  ENGE 5704: Engineering Education Graduate Seminar (1 credit X 4 semesters)

Guidelines: The purpose of these courses is to create an opportunity for students to actively engage with colleagues about topics relevant to engineering education. It is recommended that students complete the seminar requirement in their first four semesters. Although enrollment is not required beyond four semesters, all graduate students are encouraged to regularly attend seminar.

- *Three (3) Credits of Additional Research Methods Coursework:*
  ENGE 6614: Quantitative Data Analysis for Research in Engineering Education (3 credits) OR
  ENGE 6624: Qualitative Data Analysis for Research in Engineering Education (3 credits)

Guidelines: The purpose of these courses is to further student knowledge of engineering education research methods. Note that students must complete one (3 credit) quantitative and one (3 credit) qualitative social science methods course, one of which must be ENGE 6614 or 6624. If both courses are completed, one may count as a Specialization Course.

A summary of the suggested timeline for early coursework is presented in Table 1.

Table 1. Suggested course taking for ENGE required courses.

	Fall	**Spring**
Year 1	Issues [2] Research Methods [3] Disciplinary Literacy [3] ENGE Seminar [1] Grad Student Success Seminar [1]	ENGE Seminar [1] ENGE Qual Analysis [3] and/or ENGE Quant Analysis [3]
Year 2	ENGE Seminar [1]	ENGE Seminar [1] Applied Design & Assessment of Eng Ed Exp.[3]

- *Specialization Courses (36 credits)*
  - *Engineering cognate (engineering): 12 credits*
  - *Social science cognate (education or other social science): 12 credits*
  - *Electives (engineering or education theory or methods): 9 credits*

Guidelines: Each cognate represents a collection of open-electives providing broad support to a student's career development and research specialization. A cognate area will not be titled and will not be listed on a student's transcript, but a rationale supporting the choices is required in the plan of study approval process. To ensure that the PhD is sufficiently interdisciplinary, courses should be taken from a variety of departments across the three areas listed above. The *engineering cognate* is included to ensure students have graduate-level understanding of engineering concepts and should include a coherent set of courses from an engineering discipline other than engineering education. The *social science cognate* is included to ensure students have graduate-level understanding of education or other social science concepts and should include a coherent

set of courses (ENGE courses are acceptable). In addition to having cognates with ties to different disciplinary content domains to ground research, teaching, or future opportunities, we believe being immersed in two domains rooted in different epistemologies (i.e., engineering and social science) is essential for our graduates (any course substitutions should be grounded in this rationale). The *electives* category is included to ensure students continue developing theoretical and methodological expertise related to their area of specialization or interest. They may also be permitted to expand their engineering coursework, in particular for those who seek a Master's in an engineering discipline or seek to obtain a faculty position within a traditional engineering discipline. A Plan of Study is signed by a student's committee and the Assistant Department Head for Graduate Programs.

  - Constraint 1: There needs to be at least one (3 credit) quantitative and one (3 credit) qualitative social science methods course across all Plan of Study courses.
  - Constraint 2: Courses should collectively align toward a student's interests

- *Minimum of Thirty (30) Credits of Dissertation Research Hours*

- *Additional Information Pertaining to Courses*
  - Normally the student will have no more than nine (9) credits among independent study/special study courses (5974, 5984, 6974, 6984)
  - Normally categories defined above are mutually exclusive
  - At least nine (9) credits will normally be at the 6000 level, relevant to the student's research (do not have to be ENGE courses)

Simultaneous Degrees and Transferring Credits

- Up to thirty (30) credits from a Master's degree may be counted toward the PhD at the discretion of the student's advisory committee; however, no more than 50% of the graded credits for the PhD can be transferred from another institution and no more than 50% of the credits for a simultaneous master's degree earned at Virginia Tech can be used toward the PhD.
- Credits transferred to Virginia Tech must have earned grades of "B" or better, have been earned while the student was in good standing, and be acceptable for graduate degree credit at the "home" institution. Grades of "S" or "P" are not acceptable unless the course is only offered on a pass/fail basis.
- All transfer courses must have been completed within the time limits prescribed for satisfying degree requirements.
- Credits are transferred when they are entered on the plan of study and approved by the Graduate School. Transferred courses count only as credit hours and are not included in calculation of the GPA. Because these rules can sometimes shift, the Graduate School policies take precedence if the two sets of policies conflict.

<u>Timeline and Progress to Degree</u>

Students pursuing a graduate degree in the ENGE Department must satisfy the requirements of the Graduate School and the ENGE Department. The requirements of the Graduate School are integrated into those of the ENGE Department and hence will not be treated separately herein.

For a discussion of general Graduate School requirements, the reader should see the Graduate Catalog. A summary of the typical timeline for completing program requirements is presented in Table 2. Details about semester reviews are presented in sections that follow.

Table 2. Suggested program timeline (note: timeline may vary considerably by student).

Major Activity	Time Frame (assumes August start)
Select an Advisor	By beginning of Semester 2 (January 15)
Complete Coursework	Semesters 1 – 6
Qualifying Examination	Before Start of Semester 3
Plan of Study*	Semester 3
Preliminary Examination**	Semesters 3 – 6
Research Proposal*	Semesters 4 – 7
Research Progress Update Meeting*	Semesters 5 – 9
Final Examination or Dissertation Defense */**	Semesters 6 – 10+

*Form required by department and/or graduate school
** Scheduled through the graduate school online registration form

Graduate Advisor Selection

For students pursuing the PhD, the advisor must be an ENGE Graduate faculty member (tenured or tenure-track) and should have particular expertise in the area of research the student intends to pursue. Graduate School policy includes provisions to change advisors, if necessary, after filing the plan of study. In all cases, the faculty member must give their consent to serve in the capacity of graduate advisor.

Recommendations for advisor selection in tandem with the recruiting process are outlined below:

1. Faculty should be aware of the applicant pool and each applicant's advisor status.
2. Faculty should have the opportunity to interact with each student before the student selects an advisor.
3. The Graduate Program should be able to depend on faculty to participate in both the recruiting and admissions processes.
4. Students should be given agency to choose their advisor *and* to change their mind.
5. Students should not be required to select their permanent advisor too soon. The department advocates a "shop around" approach to encourage students to identify advisors with both the appropriate research and work style.

To allow ENGE PhD students sufficient time to develop their research interests, the Department encourages prospective and new students to meet with as many ENGE faculty members as possible (before selecting an advisor). Considerations should include research interests, work styles, personalities, and funding opportunities. Incoming students will be assigned a tentative advisor, who will act as one point of contact for questions during the first several months of the program. This relationship may turn into a longer-term advising relationship, but there is no expectation that it will be the case on either side. Each January, tentative advisor assignments will be revisited/confirmed. The decision of a permanent advisor is made when the Plan of Study is filed.

Changing Advisors

Students wishing to change their advisor should email the ADH for Graduate Programs and the Academic Program Manager, with a copy to the new advisor, indicating the desired change. The Academic Program Manager will confirm with the new advisor that the decision is mutual. Students are also expected to email their current advisor to notify them of this change, with a copy to the ADH for Graduate Programs and the Academic Program Manager.

If the student or advisor wishes to change advisory committee membership after the Plan of Study is submitted, they must submit a form through the Graduate School: http://graduateschool.vt.edu/academics/what-you-need-to-graduate/forms.html

PhD Advisory Committee

For the PhD, a graduate advisory (research) committee is required. The graduate advisor serves as the chair of the student's graduate advisory committee, and the student should seek the assistance of their advisor in identifying faculty members who might serve on the committee. The committee should be composed of those faculty members who can best assist the student in completing their graduate research. Each member is added to the student's committee after consenting to serve.

For students pursuing the PhD in Engineering Education, the advisory committee must include a minimum of four members; the committee should be composed of a minimum of three ENGE faculty members (including the advisor) and one member outside of the Department. At least two of the ENGE faculty members must be tenured or tenure-track. Otherwise, ENGE faculty may serve as a committee member on the basis of having earned the appropriate terminal degree (or having gained equivalent professional experience), maintaining a record of scholarly productivity, and showing evidence of successful involvement with graduate education within the previous five years. See *Committee Composition and Size*: https://secure.graduateschool.vt.edu/graduate_catalog/policies.htm?policy=002d14432c654287012c6542e38200d8

Affiliate Faculty count as external to the department, with exceptions approved by the ADH for Graduate Programs (e.g., an ENGE faculty member moves to a different university and becomes an affiliate faculty member). The Graduate School requires that at least four members hold PhDs.

Committee members are expected to attend PhD milestone meetings as a collective body. If needed, a member of the committee may attend a meeting by video or telephone connection. Faculty participation on graduate student committees is considered to be an important part of ENGE faculty responsibilities, and ENGE faculty members are expected to attend all committee meetings for graduate students they advise or on whose committees they serve.

Members of the PhD graduate advisory committee are recommended by the student and their advisor and approved by the ADH for Graduate Programs. The Department's Plan of Study form includes a section for providing a short justification for the selection of each member of the PhD Committee.

If a proposed member is not a Virginia Tech faculty member or not tenure track, a bio sketch of that proposed member must also accompany the request. In these cases, the Graduate School's

required form for University registration of non-tenure track and non-VT faculty members should also be completed.

Plan of Study

A plan of study is required of all students pursuing graduate degrees at Virginia Tech. After identifying a graduate advisor and dissertation committee, a student defines their plan of study in consultation with their advisor. The courses listed on the plan of study must include, but are not limited to, all courses required for the PhD. Students must justify their specialization courses (as a cohesive whole), as outlined previously. The PhD Plan of Study form can be found on the ENGE Intranet.

To allow ENGE PhD students sufficient time to select an advisor and committee, the plan of study should be submitted by the end of the 3rd academic semester as suggested by the Graduate School.

The plan of study approval process includes review and signed approval by the student's advisor, graduate committee members, and the ADH for Graduate Programs. The Plan of Study is to be submitted to the Academic Programs Manager for electronic approval by the ADH for Graduate Programs and the Dean of the Graduate School.

Required PhD Milestones and Examinations

All ENGE PhD students are required to complete the following milestones in the order listed (Tabled 3), ensuring to meet the scheduling and reporting requirements.

Table 3. PhD Milestones and Process for Scheduling an Exam and Reporting Results

Order	Milestone	Scheduling Process	Result Reporting Process
1	Qualifying Examination*	Student submits written material via Canvas and then ADH for Graduate Programs schedules the oral exam	ADH for Graduate Programs will record the exam results
2	Preliminary Examination	Student submits prospectus to committee, identifies meeting time, and officially requests exam in Electronic Signature Approval System (ESS) at least two weeks prior	Advisor reports exam results in ESS following the exam
3	Research Proposal	Student submits proposal to committee and identifies meeting time	Advisor reports exam results via Proposal Form** to Academic Programs Manager
4	Progress Meeting	Student schedules meeting time with committee	Advisor reports exam results via Progress Meeting Form** to Academic Programs Manager

5	Dissertation/Final Examination	Student submits dissertation to committee at least four weeks prior to defense, and requests exam in ESS at least two weeks prior	Advisor reports exams results in ESS following the exam

[*]The ENGE Graduate Faculty administers the Qualifying Examination, and the student's advisory committee administers all others.
*** The milestone forms are located on the* **ENGE Intranet**

Additionally, all students are required to submit materials for the departmental review process; details will be communicated to students annually. Failure to complete this requirement in a timely manner may result in loss of funding and/or a hold on the student's account. Note: students and their advisors are strongly encouraged to review progress on a more frequent basis.

Qualifying Examination

The ENGE Qualifying Exam is designed to assess a first-year Ph.D. student's ability to independently articulate, synthesize, and apply concepts and skills introduced in the core Ph.D. courses. This examination assesses a student's writing ability and conversational fluency regarding salient topics, current and historical challenges, and scholarship related to engineering education. It also assesses students' competence in the research skills required to evaluate, select, and justify alternatives when developing a research design that aligns a relevant problem, research question, theory, social science methods, and potential implications. Proficiency in these concepts and skills must be demonstrated in a written and oral format.

The Qualifying Examination must be completed before the Preliminary Examination.

Components
***NOTE: The Graduate Committee reserves the right to modify some of these plans following each iteration. Any changes will be communicated to students in the Spring semester.

- **Cover Letter (up to 2 pages):**
  - Each student should complete a cover letter explaining the contents of their mini-studies. At a minimum, the cover letter should briefly describe how they approached completing the mini-studies and preparing for the qualifying exam. Their discussion should also briefly address how this preparation reflects or emerged from your development as an engineering education researcher over the past year.
  - This cover letter may be discussed and reviewed with other students, faculty, and the advisor.
- **Two Mini Research Studies (approx. 2,000 words apiece, not including references):**
  - Students will be given a prompt and asked to design two mini research studies for that context (approx. 2,000 words apiece). Such an ask of engineering education researchers happens quite often, so this does replicate practice.
  - Important note: this is not a prospectus for the dissertation. We do not want to ask students to narrow their focus too early in a program.
  - These studies should include a brief introduction that motivates the study, a theoretical underpinning section, and a research methods section. One study should

be a quantitative-based approach, the other should be a qualitative-based approach, and different theoretical/conceptual frameworks should be used in each study.
    - Citations from the core classes are sufficient for formulating these studies, but students are welcome to use outside sources as they wish.
    - This should be only the student's individual work with no outside assistance.
- **Oral Exam (45-55 mins)**
    - Each qualifying class will have a list of concepts/themes that will be provided to students and faculty by May. The concept lists will be generated by the faculty member teaching the class and reviewed by the Graduate Committee and then the full faculty. Students should be conversant in the topics and be able to talk across topics and understand the relationship between topics—the goal is to demonstrate fluency in the field.
    - Students are encouraged to work with peers and faculty members throughout the summer to review their understanding of these concepts.
    - During the exam, faculty panels will select some of these concepts and ask students to demonstrate their understanding. Students may bring notes to the exam, but the expectation is that students will be conversant and not reliant on the notes.
    - Faculty will ask questions about the mini research studies as well. An example question might be: "In your research study, you proposed to explore X. Please explain the alignment across your research questions, selected frameworks, and proposed methods."
    - Faculty will also ask questions related to students' cover letters.

Evaluation

Faculty members will work hard to communicate exam results as close to the beginning of the Fall semester as possible. Same-day decisions should not be expected. The rubric for the qualifying exam will be provided to students in advance.

Consistent with other exam milestones, two or more "fail" votes by Graduate faculty panelists will trigger a request for students to complete additional tasks if they believe students are not fully grasping certain concepts, having insufficient rationale for their programs, or if writing needs additional work. These remediation plans will be based on a holistic assessment of both the written materials and the oral examination and will be tailored for individual students.

Students will have the Fall semester to complete the remediation process. If there are extraordinary circumstances, extensions to this timeline may be requested in writing to the Graduate Committee, which has decision-making authority on each of those cases. If a student receives an extension, they may be placed on academic probation within the department to communicate the urgency with which tasks should be completed. Failure to complete the remediation process will result in program dismissal.

As with all grades, the Graduate School permits students to appeal the exam result. Normally, appeals are directed to the course instructor, but the Qualifying Exam does not have an instructor. Therefore, the procedures are as follows. If appealing a result on the Qualifying Exam, the student should speak with their advisor. The student and advisor will submit a written appeal to

the ADH for Graduate Programs. The ADH and Graduate Committee will determine the appropriate course of action for addressing the appeal.

If the ADH for Graduate Programs is serving as the student's advisor, the student and advisor will submit the written appeal to the Department Head. The Department Head and Graduate Committee will determine the appropriate course of action for addressing the appeal.

Scheduling

The qualifying is offered annually with the written response completed over the summer months and the oral exam taking place in August, just before classes begin. Students should complete the ENGE Qualifying courses (see above) within the first year of enrollment in the PhD program and complete the qualifying exam the summer after finishing the courses. Students with an "incomplete" in any of the Qualifying courses will not be permitted to attempt the Qualifying Exam until each "incomplete" is resolved and a passing grade earned. Qualifying Exam dates will be announced well in advance of the exam.

Extensions on submissions for the Qualifying Exam will only be granted under extenuating circumstances in consultation with the Graduate Committee and/or Department Head. Extenuating circumstances are usually personal or health problems that we define as: "Exceptional, short-term events which are outside of a student's control and have a negative impact upon their ability to complete the Qualifying Exam." It is the responsibility of the student to notify the ADH for Graduate Programs at the earliest opportunity if there are any extenuating circumstances that might have a bearing on qualifying examination performance.

Students with disabilities documented by the SSD office who wish to seek accommodations on this examination or any other listed above must submit their request in writing to the ADH for Graduate Programs no less than 30 days prior to the start of the examination. SSD typically does not allow accommodations for take-home examinations. However, the Graduate Committee is committed to working with students and SSD.

Preliminary Examination

The Preliminary Examination in Engineering Education is a vital and required step towards students' preparation for undertaking doctoral level research. The purpose of this examination is to assess one's readiness to pursue creative, original, independent research at a level typically expected of PhD students. Along with the Qualifying Examination, the Preliminary Examination is one component required to gain status as a doctoral candidate in the Department of Engineering Education. The Qualifying Examination must be completed before the Preliminary Examination. Engineering Education PhD students advance to candidacy after successfully passing the Preliminary Examination but must still write and defend a research proposal before beginning their research.

Preliminary Examinations must be scheduled through the Graduate School. This document supplements Graduate School policies listed in the Graduate Catalog. The purpose of this description is to establish common expectations for the Preliminary Examination and Proposal Defense, and to protect both ENGE students and faculty.

Components

In preparation for the Preliminary Exam, the student will submit a prospectus describing their proposed dissertation research area. The goal of the prospectus is to provide sufficient information about the student's research interest to enable the committee to develop questions that will effectively support the student in developing this research idea into a full proposal. While exact details of the prospectus are negotiated between the advisor and the student, these documents are typically 5000-7500 words and include an overview of the motivation and need for the study, a brief background on some of the relevant literature informing the study, a discussion of one or more potential theoretical frameworks, and a discussion of one or more potential research methods. The prospectus is NOT a proposal; rather, it is a place for the student to lay out a potential dissertation idea in a way that allows the committee to pose relevant questions and determine whether the student is ready to develop a full proposal.

The Preliminary Examination for ENGE PhD students includes both written and oral components. The written portion of the examination is completed over a period of up to four weeks of writing. Students may choose to complete the exam in a shorter two-or three-week time period. A common format is approximately three or four questions related to the research area of interest to the student based on a prospectus developed by the student in consultation with their advisor.

Students should not expect reprieves from their assistantship expectations during the exam period. The final product that committees will review should not move in level of expectations relative to the length of the exam period —i.e., questions should be answerable in a two-week period. Extensions of more than 24 hours beyond the original deadline, which would only be granted under extraordinary circumstances, should only be granted in consultation with the Department Graduate Committee.

The oral portion of the Examination is administered at least two weeks after completion of the written portion and must be scheduled through the Graduate School. Faculty serving on ENGE PhD committees should be given at least two full weeks to read and review the Preliminary Examination written responses. Because the exam is a Graduate School exam, the student must be actively enrolled in at least 3 credit hours in the term in which the oral exam is scheduled.

The Preliminary Examination is to be solely the work of the PhD candidate, and no external assistance from other individuals is allowed, including proofreaders or writing assistance. To do otherwise will be considered a violation of the honor code, and cases will be forwarded to the Graduate Honor System. Students must be registered during the semester the Examination is taken. Students may not schedule the Preliminary Examination until they have an approved Plan of Study.

Evaluation

The student's advisory committee administers the Preliminary Examination. To pass the examination, a degree candidate must have a favorable vote from a majority of the examining committee, with a maximum of one negative vote. All members of the student's advisory committee must attend the oral portion of the examination; virtual attendance is acceptable when necessary. If performance on the Preliminary Examination is unsatisfactory, one full semester

must lapse (15 weeks) before the Examination is administered a second time. The student must then retake the exam within 12 months of the first result of the oral examination. Students who fail to retake the exam within this period will be placed on academic probation during the subsequent semester to communicate the urgency with which tasks should be completed. Extensions to this timeline may be requested in writing to the Graduate Committee who will have decision-making authority on each of those cases. Students failing the Preliminary Examination twice will be dismissed from the program.

The specific expectations and format of the second attempt at the Preliminary Examination are ultimately governed by the student's dissertation committee. However, these expectations should be clearly documented in writing and given to both the student and the ADH for Graduate Programs. It is acceptable for this second attempt to mimic the exact format of the first attempt (i.e., submitting a prospectus, receiving newly crafted questions, writing responses to those questions in a 2 or 4 week timeframe, orally defending the written responses). It is also acceptable for the committee to specifically cater the second attempt to target the areas that were unsuccessful in the student's first attempt. Given that the purpose of the preliminary exam is to assess one's readiness to pursue creative, original, independent research at a level typically expected of PhD students, it is generally expected that the second attempt of a preliminary exam would involve significant new written work to accompany the required oral defense.

The result of the examination is recorded through the Electronic Signature Approval System (ESS) on the day of the oral portion of the examination. Each member of the student's advisory completes the electronic examination card. Advisory committees reserve the right to alter a plan of study based on performance on the Preliminary Examination, for example, to require coursework addressing a deficiency not serious enough to warrant failure of the Examination.

Scheduling

The oral examination portion of preliminary examination scheduling will be processed digitally through Electronic Signature Approval System (ESS) at https://ess.graduateschool.vt.edu/. Students will sign into the ESS to request their preliminary examination. Advisory committee members will sign into the ESS to approve the preliminary examination request as well as electronically sign the examination card (notification sent to the @vt.edu email address). The preliminary examination request must be submitted at least 2 weeks prior to the oral examination date. The ESS does not allow a student to request an exam date less than two weeks from the examination request submission date. It is important that students plan in advance with their advisory committee to ensure that all advisory committee members can attend the examination for the date/time requested. If any member of the advisory committee does not approve the preliminary examination request, the student will need to resubmit with a new date/time. Requesting a room in the examination request does not reserve the room; students must reserve the room through the department's room reservation coordinator. Once an examination request is approved by the advisory committee and the Graduate School, an email confirmation will be sent to the student, advisory committee, and department staff coordinator with notification of the official examination scheduling. An examination should not be held without receipt of the notification email from the Graduate School. Please contact the Graduate School before the examination if you have not received a scheduling notification.

Research Proposal

To initiate dissertation research, the student is required to prepare a research proposal. This proposal must be in written form and must be presented to the advisory committee at a meeting where all committee members are present (in person, via phone or video teleconference).

Components
The research proposal should describe the background, purpose, and methods of the research, the outcome anticipated, and the contribution to the field. The student should consult with their committee regarding expectations for length, scope, and format.

Evaluation
Signatures of each committee member on the proposal approval form signify approval of the proposed research effort. This form is delivered to the ENGE Graduate Program Coordinator for inclusion in the student's academic record. A student pursuing a PhD should demonstrate the ability to carry out original and creative research, and the results of the research should be sufficiently significant to be publishable in a major academic journal. Thus, the writing style, grammar, and spelling of the proposal and dissertation should reflect a high level of skill in written communication.

Exam Scheduling
The time of this meeting is determined by the student's advisory committee.

Progress Meeting

Between the research proposal and the Final Examination, the student is required to have at least one progress meeting with their advisory committee, where all committee members are present.

Components
The components of this meeting are determined by the student's advisory committee.

Evaluation
The advisory committee signs the progress report form and this form is included in the student's academic record.

Scheduling
The time of this meeting is determined by the student's advisory committee, but can be no later than three weeks preceding the scheduled final defense.

Dissertation/Final Examination

All graduate students pursuing a PhD are required to pass an examination with an oral component administered by the advisory committee. The examination is typically an oral defense of the dissertation. Dissertations must be filed and approved electronically with the Graduate School through the Electronic Thesis and Dissertation (ETD) system. The dissertation must be submitted to the student's advisory committee at least four weeks prior to the Final Examination.

Components

Dissertations may be prepared in the traditional multi-chapter format or in manuscript format (minimum of two journal articles [pre-submission], plus front and back matter as indicated in the guidelines). http://etd.lib.vt.edu/etdformats.html

Evaluation

To pass the Final Examination, a degree candidate must have a favorable vote from a majority of the examining committee, with a maximum of one negative vote. If a committee member does not approve the dissertation, upon the faculty member's request, a written dissenting opinion can be bound with the final document. If a student fails the Final Examination, there must be a lapse of one full semester (15 weeks) before rescheduling the examination. A student is allowed no more than two opportunities to pass the Final Examination.

The result of the Final Examination must be reported to the Graduate School through the Electronic Thesis and Dissertation (ETD) system. The student, advisor, committee members, and the ENGE Graduate Program Coordinator are notified once the ETD process is complete and the document is available online. In addition, the student completes an exit interview with the ENGE Graduate Coordinator.

Scheduling

The Final Examination is a requirement of the Graduate School and must be administered during a semester in which the student is registered. To schedule a Final Examination, the student must submit their dissertation manuscript to their committee four weeks prior to the exam. The ENGE departmental policy requires that faculty are given two weeks to read documents prior to signing the scheduling request.

For scheduling of the final examination, the dissertation must be ready for defense (i.e., any revisions to the written document should be able to be completed within two weeks) as judged by committee members having read the document and signed a departmental examination scheduling request. The student must be able to complete all other degree requirements within the semester when the examination is held: all coursework on the Plan of Study will need to be completed with grades of C- or higher and both the Plan of Study GPA and the overall GPA must be a 3.0 or higher by the end of the semester. Because some of the problem situations with deficient grades or credits require retaking courses or adding credits, the Plan of Study should be examined at the beginning of the semester in which a student plans to take the Final Examination.

Final Examinations are open to the public and must be advertised as soon as the exam is scheduled with the Graduate School. Students are required to submit their dissertation abstract (150-300 words) and their professional biography (50-100 words) to the Graduate Coordinator when they send the request to the Graduate School. The Graduate Coordinator then sends out the announcement as soon as time and date confirmation is received.

Appealing an Exam Decision

Grounds for appealing an exam decision are governed by the Graduate School. https://secure.graduateschool.vt.edu/graduate_catalog/policies.htm?policy=002d14432c654287012c6542e3720049

ENGE GRADUATE STUDENT AWARDS

The department has two endowed awards recognizing excellence in graduate work in the Engineering Education department. The awards are named for ENGE Professor and College of Engineering Associate Dean for Equity and Engagement, Dr. Bevlee Artis Watford. These awards are determined in December of each year and presented at a department gathering the following spring. Both of these awards come with a monetary gift.

The Dr. Bevlee Artis Watford Outstanding Doctoral Student Award is given to celebrate an all around outstanding doctoral student in their contributions to the research, teaching, and/or engagement missions of Virginia Tech. All current ENGE students or recent graduates are eligible for this award, though the nature of the award criteria will likely result in awardees being towards the end of their doctoral programs. A recent graduate in a given year is eligible for consideration the December of the year they graduate. Open nominations for this award will be accepted from faculty and students during the Fall semester.

The Dr. Bevlee Artis Watford Outstanding Dissertation Award is given to celebrate the outstanding research contribution made to the field of engineering education by a recent graduate of our doctoral program. Each ENGE dissertation will be considered for the award in the calendar year in which it was successfully defended. In the case of a December defense the dissertation will be only considered for the award in the calendar year of the defense, as long as the ETD is submitted by Jan 15. All students will be considered for this award based on a nomination form completed by all dissertation committee members within one week of the student's final defense. For reference, the form can be found here: https://forms.gle/5rszWibZkSKnikoS7

Additionally the department recognizes up to two students for **Graduate Student Teaching Excellence**, one for a GTA serving as Assistant and one for a GTA serving as Instructor of Record. Nominations are solicited in November for students who served as a GTA in the calendar year (Spring or Fall semesters). Criteria for the Graduate School awards by the same name are used for department awards. Each award consists of a plaque and recognition at a department gathering in the spring.

Students receiving the Dr. Bevlee Artis Watford Outstanding Dissertation Award, the Dr. Bevlee Artis Watford Outstanding Doctoral Student Award, the Teaching Excellence Award (as an Assistant) and the Teaching Excellence Award (as Instructor of Record) become the departmental nominees for the College of Engineering Outstanding PhD student award and the Graduate School's Outstanding Dissertation and Teaching Excellence awards, respectively. Nominations for these awards are due in January for the prior calendar year. The criteria for the awards can be found on the Graduate School website:

- Outstanding Dissertation: https://graduateschool.vt.edu/about/awards/student/outstanding-graduate-student.html
- Outstanding Graduate Student: https://graduateschool.vt.edu/about/awards/student/outstanding-graduate-student.html
- Teaching Excellence Awards: https://graduateschool.vt.edu/about/awards/student/teaching-excellence.html

Approved by Graduate Committee 04 26, 2023

ENGINEERING EDUCATION GRADUATE CERTIFICATE

The education of future engineers is an increasingly critical issue for 21st century universities. Enhancing undergraduate education, however, requires enhancing the preparation of those who teach undergraduates. The success of calls for reform depends on educating a new kind of engineering professor — one who, in addition to conducting cutting-edge research in their specialty, also understands the theory and practice of teaching, keeps current with (and possibly conducts) research in engineering education, and leads colleagues to implement changes at program as well as course levels.

Goals and Objectives

The Graduate Certificate in Engineering Education is designed to serve as evidence that the holder has completed a set of experiences, including having teaching responsibility, to begin their preparation as a successful faculty member.

Target Population

Current graduate students in any Virginia Tech department wishing to demonstrate knowledge of educational theory and practice as applied to engineering topics.

Admission Requirements

Graduate students wishing to earn the Graduate Certificate in Engineering Education must be currently enrolled (not provisional) Master's or Doctoral students in good standing in any Virginia Tech discipline or major. For admission to the Certificate program, applicants must also satisfy at least one of three requirements:

1. Enrollment in a graduate program in the College of Engineering, or
2. A Bachelor's degree in any field of engineering, or
3. A Bachelor's degree in the physical or biological sciences or mathematics.

Applicants who do not meet any of the three requirements may request special consideration from the ENGE Graduate Committee. In this case, please provide a brief statement detailing your interest, experience, and/or connections to engineering which motivate you to pursue the certificate.

Application

To apply for the Engineering Education Graduate Certificate, please visit the Graduate School's website. More information from the Graduate School about certificates can be found here: https://graduateschool.vt.edu/academics/programs/graduate-certificates.html

ENGE Certificate Course Requirements

To earn the Certificate, graduate students must complete a minimum of 12 graduate credits, all of which must be taken for a letter grade, with the exception of 1 credit seminar courses.

Six (6) Credits of Required Core Courses:
ENGE 5304: Graduate Student Success in Multicultural Environments (1 credit)
ENGE 5214: Issues in Engineering Education (2 credits) [offered each Fall]

ENGE 5514: Applied Design and Assessment of Engineering Education Experiences (3 credits) [Offered each Spring]

Six (6) Credits of Elective Courses:
Any 3-credit course with an ENGE prefix will count towards this elective requirement. Students may also choose to use select courses from the Graduate School or approved courses from the School of Education to count towards this elective requirement. Examples of non-ENGE courses include the following:

EDEP 5114: Learning and Cognition (3 credits)
EDEP 6444: Motivation and Cognition (3 credits)
EDEP 6644: College Teaching (3 credits)
EDHE 6424: Institutional Effectiveness & Outcome Assessment in Higher Education (3 credits)
EDIT 5164: Design for Learning (3 credits)
EDIT 5274: Foundations of Instructional Design and Theory (3 credits)
EDRE 5404: Foundations of Educational Research & Evaluation (3 credits)
EDRE 5644: Questionnaire Design and Survey Research in Education
EDRE 6605-6606: Quantitative Research Methods in Education I & II (3 credits each)
EDRE 6504: Qualitative Methods in Educational Research I (3 credits)
EDHE 6424: Institutional Effectiveness & Outcome Assessment in Higher Education (3 credits)
GRAD 5104: Preparing the Future Professoriate (3 credits)
GRAD 5114: Contemporary Pedagogy (3 credits)
GRAD 5984: Critically Engaged Teaching with Advanced Technology (3 credits)
STS 6614: Advanced Topics in Technology Studies (Engineering only) (3 credits)

Students may request approval from the ENGE Graduate Committee for other courses to be used to fulfill elective requirements.

Approved by Graduate Committee 04 26, 2023

ENGE GRADUATE FACULTY

Numbers in parentheses indicate the year of first tenure-track appointment at Virginia Tech. More detailed information can be found about ENGE faculty at: https://enge.vt.edu/People/researchfaculty.html

1. Bevlee A. Watford | Professor (1992), PhD, Industrial & Systems Engineering, Virginia Tech
2. Vinod K. Lohani | Professor (1998), PhD, Civil Engineering, Virginia Tech
3. Marie C. Paretti | Professor (2004), PhD, English, University of Wisconsin, Madison
4. Lisa D. McNair | Professor (2005), PhD, Linguistics, University of Chicago
5. Holly Matusovich | Professor, (2009), PhD, Engineering Education, Purdue University
6. David Knight | Associate Professor (2013), PhD, Higher Education, Pennsylvania State University
7. Diana Bairaktarova | Associate Professor (2015), PhD, Engineering Education, Purdue University
8. Jacob Grohs | Associate Professor, Assistant Department Head for Graduate Programs (2015), PhD, Curriculum & Instruction, Virginia Tech
9. Walter Lee | Associate Professor (2015), PhD, Engineering Education, Virginia Tech
10. Jenni Case | Professor, Department Head (2017), PhD, Faculty of Education, Monash University
11. Nicole Pitterson | Assistant Professor (2017), PhD, Engineering Education, Purdue University
12. Jeremi London | Assistant Professor (2018), PhD, Engineering Education, Purdue University
13. Homero Murzi | Assistant Professor (2018), PhD, Engineering Education, Virginia Tech
14. Andrew Katz | Assistant Professor (2019), PhD, Engineering Education, Purdue University
15. Mark Huerta | Assistant Professor (2022), PhD, Engineering Education Systems and Design, Arizona State University
16. Dayoung Kim | Assistant Professor (2022), PhD, Engineering Education, Purdue University
17. Sarah Rodriguez | Associate Professor (2022), PhD, Higher Education Leadership , University of Texas at Austin
18. Susan Sajadi | Assistant Professor (2022), PhD, Engineering Educations Systems and Design, Arizona State University
19. Qin Zhu | Associate Professor (2022), PhD, Engineering Education, Purdue University

ADDITIONAL VIRGINIA TECH POLICIES

Equal Opportunities/Affirmative Action Policy
(See Policy 1030, "Affirmative Action Policy")

Virginia Tech does not discriminate against employees, students, or applicants on the basis of race, color, sex, sexual orientation, disability, age, veteran status, national origin, religion, or political affiliation. The University is subject to titles VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Sections 503 and 504 of the Rehabilitation's Act of 1973, the Age Discrimination in Employment Act, the Vietnam Era Veteran Readjustment Assistance Act of 1974, Federal Executive order 11246, Governor Gilmore's State Executive Order Number Two, and all other rules and regulations that are applicable. Anyone having questions concerning any of those regulations should contact the Equal Opportunity/Affirmative Action Office, 336 Burruss Hall, Blacksburg, Virginia 24061, 540.231.7500, TDD 540.231.9460. Individuals with disabilities desiring accommodations should contact the Dean of Students office, 540.231.3787, TDD 800.828.1120.

Sexual Harassment Policy
(See Policy 1025, "Sexual Harassment Policy")
Sexual harassment is considered to be a form of discrimination based on sex and falls within the statutory prohibitions against sex discrimination. The University is committed to maintaining a working and study environment free of sexual harassment. Accordingly, in compliance with Section 703 of Title VII of the Civil Rights Act of 1964 and Title IX of the Education Amendments of 1972, it is the University's policy not to tolerate any verbal, nonverbal, or physical behavior, which constitutes sexual harassment. Personnel with supervisory responsibilities are required to take immediate and appropriate action when incidents of alleged sexual harassment are brought to their attention. Violations of the policy prohibiting sexual harassment may lead to disciplinary actions, including reprimand, suspension, or termination of employment or academic status.

Sexual harassment is defined as unwelcome sexual advances, request for sexual favors, and other verbal, or nonverbal, or physical conduct of a sexual nature when:

- Submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment or academic decisions, or
- Submission to or rejection of such conduct by an individual is used as the basis for employment or academic decisions, or
- Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment

Faculty, staff, students, and applicants for employment or admission with complaints of sexual harassment should contact the University EO/AA Office on a confidential basis and request an informal investigation. Faculty, staff, and students may file formal complaints outside the University. Students may file formal complaints with the Office of Civil Rights of the Department of Education. Faculty may file formal complaints with the Equal Employment Opportunity Commission. Staff may contact the State EEO Office or the Equal Employment Opportunity Commission.

Acceptable Use Of Information Systems At Virginia Tech
(See Policy 2015, "Acceptable Use of Computer and Communication Systems")

General Principles
Access to computer systems and networks owned or operated by Virginia Tech imposes certain responsibilities and obligations and is granted subject to University policies, and local, state, and federal laws. Acceptable use is always ethical, reflects academic honesty, and shows restraint in the consumption of shared resources. It demonstrates respect for intellectual property, ownership of data, system security mechanisms, and individuals' rights to privacy and to freedom from intimidation and harassment.

Guidelines
In making acceptable use of resources the student must:

- Use resources only for authorized purposes.
- Protect your user ID and system from unauthorized use. You are responsible for all activities on your user ID or that originate from your system.
- access only information that is your own, that is publicly available, or to which you have been given authorized access.
- use only legal versions of copyrighted software in compliance with vendor license requirements.
- be considerate in your use of shared resources. Refrain from monopolizing systems, overloading networks with excessive data, degrading services, or wasting computer time, connect time, disk space, printer paper, manuals, or other resources.

In making acceptable use of resources you must NOT:

- Use another person's system, user ID, password, files, or data without permission.
- Use computer programs to decode passwords or access control information.
- Attempt to circumvent or subvert system or network security measures.
- Engage in any activity that might be purposefully harmful to systems or to any information stored thereon, such as creating or propagating viruses, disrupting services, or damaging files or making unauthorized modifications to University data.
- Use University systems for commercial or partisan political purposes, such as using electronic mail to circulate advertising for products or for political candidates.
- Make or use illegal copies of copyrighted materials or software, store such copies on University systems, or transmit them over University networks.
- Use mail or messaging services to harass or intimidate another person, for example, by broadcasting unsolicited messages, by repeatedly sending unwanted mail, or by using someone else's name or user ID.
- Waste computing resources or network resources, for example, by intentionally placing a program in an endless loop, printing excessive amounts of paper, or by sending chain letters or unsolicited mass mailings.
- Use the University's systems or networks for personal gain; for example, by selling access to your user ID or to University systems or networks, or by performing work for profit with University resources in a manner not authorized by the University.
- Engage in any other activity that does not comply with the General Principles presented above.

Enforcement

The University considers any violation of acceptable use principles or guidelines to be a serious offense and reserves the right to copy and examine any files or information resident on University systems allegedly related to unacceptable use, and to protect its network from systems and events that threaten or degrade operations. Violators are subject to disciplinary action as prescribed in the Honor Codes, the University Policies for Student Life, and employee handbooks. Offenders also may be prosecuted under laws including (but not limited to) the Communications Act of 1934 (amended), the Family Educational Rights and Privacy Act of 1974, the Computer Fraud and Abuse Act of 1986, The Computer Virus Eradication Act of 1989, Interstate Transportation of Stolen Property, The Virginia Computer Crimes Act, and the Electronic Communications Privacy Act. Access to the text of these laws is available through the Newman Library Reference Department.