

# Engineering Education Graduate Manual



2015-2016

Department of Engineering Education  
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## **ENGINEERING EDUCATION GRADUATE PROGRAM**

### **Mission**

- To support the critical role of engineering societal and global development
- To improve the synergistic role of education research, teaching, practice, and advising in engineering
- To promote the value of and need for educating and developing engineering professionals

### **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 to be followed in 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/](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 the ENGE Department 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 the student should consult the Graduate Policies and Procedures and Course Catalog for a complete description of those requirements:

<http://graduateschool.vt.edu/academics/pg>

The requirements, policies, and procedures set forth herein apply to students joining the ENGE Graduate Program on or after Fall Semester 2015. It is the responsibility of each graduate student in ENGE 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 develops all requirements, policies, and procedures for the ENGE Graduate Program with input from students and faculty.

The Graduate Coordinator serves as administrative assistant to the Graduate Program, maintains all files for the graduate program, is the source of information on the graduate program including but not limited to: forms for carrying out graduate program and Graduate School requirements, course registration, application for admission and financial aid, grade changes, and other routine paperwork relating to the graduate program.

The Virginia Tech Department of Engineering Education offers a Graduate Certificate in Engineering Education and a Doctor of Philosophy (PhD) Degree in Engineering Education.

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

Department Head: Dr. Stephanie Adams  
540.231.6555  
sgadams@vt.edu

ADH for Graduate Programs: Dr. Holly Matusovich  
540.231.4205  
matushm@vt.edu

Graduate Program Coordinator: Linda Hazelwood  
540.231.7359  
lindawh@vt.edu

### **Application for Admission to the ENGE Graduate Program**

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

- Completed 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,
- Graduate Record Examination (GRE) scores (no minimum GRE scores are required beyond those enforced by the Graduate School),
- TOEFL scores for students whose first language is not English.

GRE scores and unofficial transcripts are required even for applicants holding other degrees from Virginia Tech.

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:  
<http://graduateschool.vt.edu/applying>

TOEFL scores (if applicable), GRE scores AND unofficial transcripts must be received by the Graduate School before the application can be considered complete and released to the ENGE Department for consideration. The application review process is addressed later in this manual.

### **Graduate Student Orientation**

Prior to the start fall 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 selecting a faculty advisor, the graduate honor system, and other topics of importance to new students. For students serving as teaching assistants, additional Department and University training is also required.

### **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 be apply before January 15 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. The monthly stipend for GTAs and GRAs varies depending on the nature of the assistantship and the graduate level of the student. All assistantships carry a waiver of tuition, except those awarded during summer terms.

Fees included in enrollment include:

Engineering Fee - \$435.50

Comprehensive Fees (Student Activity, Health, Athletic, Bus, Recreation Sports, Student Service) - \$876.00

Out of State Capital Fee - \$302.00

Technology Fee - \$34.50

Library Fee - \$20.00

Students pay the comprehensive fees and the out-of-state capital fee. All other fees are usually paid for with their fellowship/assistantship.

These are estimated fees and should be verified. All the fees can be found on the Bursar's website:

<http://www.bursar.vt.edu/tuition/2015-2016.php#graduate>

Teaching assistants must be on campus one week prior to the start of classes. The dates of the ENGE Department PhD student orientation are coordinated with other training activities to avoid conflicts. A student who is awarded a full-time GTA is obligated 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. GRA awards are made to support research projects that are supervised by ENGE faculty; hence, the principal investigator for the research project from



which the funding comes awards GRAs. GRA offers should include a discussion of expectations for ongoing funding and advisor relationships. A student receiving a full-time GRA is expected to work 20 hours per week during the semester for which the award applies, the duties being assigned by the principal investigator. The duties of a student on a fellowship depend on the particular fellowship and are not covered in this manual.

Students holding a full-time -assistantship must carry a course load of at least 12 credit hours per semester, and not more than 18 hours (until required coursework is completed). Until a student passes the qualifier, if he or she is funded on a GTA, he or she must be registered for at least one class unless she or he has 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 additional or outside employment is allowed.

### **Continuing an Assistantship**

Continued assistantship support is competitive and dependent on 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 of an exemplary nature. At the end of each semester the faculty members directly supervising the student will evaluate the quality and quantity of work performed (using materials such as student progress reviews and teaching evaluations) and make recommendations for continuance of GTA or GRA students to the Department Head. Similarly, the ENGE Graduate Committee reviews the performance of graduate students, with input from the advisor, at the end of each semester (see Academic Eligibility). Students are typically allowed three years of GTA support. After three years, the student must reapply for the GTA and be approved for further support by the Graduate Committee.

Request for renewal of assistantships will be considered, along with new applications, in the early spring and fall of each year. With input from advisors, the ENGE Graduate Committee makes recommendations to the ADA for Graduate Programs, who then awards assistantships for the following semester along with the ADH for Undergraduate Programs.

### **Changing From a GTA/GA to GRA**

A student who has been offered and accepted a GTA contract for a given semester may give up a GTA in favor of a GRA up to three weeks (21 days) before the fall contract start date or before the end of the fall semester for spring classes. Beyond that time, a GTA may be vacated in favor of a GRA only with the consent of the ADH for Graduate Programs and the ADH for Undergraduate Programs. If the decision is reached that the GTA position cannot be vacated, the Department Head will be consulted before the decision is implemented. One consideration in the decision is the availability of qualified graduate students to fill the vacated GTA or GRA position.

### **Academic Eligibility**

For academic eligibility, a student must maintain a cumulative grade point average of 3.00 or better for all courses taken while in Graduate School at Virginia Tech. The ENGE Department continuously monitors the progress of each graduate student. At the end of each semester the graduate advisor reviews the progress of each ENGE graduate student. This review will consider

the student's cumulative grade point average and their progress toward degree as represented in the student's eportfolio; the results of these reviews will be recorded in ENGE progress review forms (can be found on the [ENGE Grads Scholar](#) website). Any student with a cumulative grade point average below 3.00 for his/her last semester of graduate work or whose eportfolio is found deficient will be placed on academic probation and may be required to appear before the Graduate Committee. The purpose of this appearance is to discover the source of the difficulties evidenced by unsatisfactory progress and to outline avenues that the student should pursue to improve his/her performance. In accordance with Graduate School and ENGE Departmental policy, any student who fails to meet these requirements in two successive semesters will typically be dismissed from the ENGE graduate program. The student's advisor will be consulted at all stages in this process.

There are a variety of reasons a student may receive an "incomplete" in a course. If the "incomplete" 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 appear before the Graduate Committee. The purpose of this appearance is to discover the source of the difficulties and to outline avenues that the student should pursue to improve her/his performance. 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.

### **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 work performed by faculty and students in the Department. The faculty of the Department of Engineering Education expects all students to maintain academic integrity at all times in the classroom and the research laboratory and to conduct their academic work in accordance with the high ethical standards of the engineering 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 Department of Engineering Education "Scholarly Ethics and Integrity Plan" was approved by the Graduate School April 2014 and is posted on the ENGE Scholar site.

The Graduate Honor Code establishes a standard of academic integrity. As such, this code 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 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 at the following Virginia Tech website:

<http://graduateschool.vt.edu/academics/ethics>

Violations of academic integrity will result in disciplinary actions ranging from failing grades on assignments and courses to probation, suspension, or dismissal from the University. It is recognized that the graduate students have very diverse cultural backgrounds. In light of this, 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 major professors, Department Heads, the international students office, or the Graduate School for further information on what is expected of them.

More specifically, all graduate students, while being affiliated with Virginia Tech, shall abide by the standards established by Virginia Tech, as these are 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.

Specific guidance regarding potential honor code violations on the Qualifying and Preliminary Examinations is described in the sections on those Examinations. In all written work completed for ENGE course and degree program requirements, students should be sure to fully cite sources of ideas as well as direct quotes. To avoid plagiarism, students should use direct quotes around any strings of text longer than three words that are directly copied from any other source.

### **ENGINEERING EDUCATION GRADUATE CERTIFICATE**

The education of future engineers is an increasingly critical issue for 21<sup>st</sup> century universities. Enhancing undergraduate education, however, requires enhancing the preparation of those who teach undergraduates. The success of these calls to reform, then, depends on educating a new kind of engineering professor — one who, in addition to conducting cutting-edge research in his or her 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 curricular 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. The Committee will stipulate coursework that the student would need to begin studies for the Certificate and may recommend that the student be admitted on a provisional basis until the specified coursework is successfully completed. In general, the specified coursework will not count toward the credits required for the Certificate.

### **Advisor**

Students in the Engineering Education Graduate Certificate program are not required to have an advisor in ENGE.

### **ENGE Certificate Course Requirements**

To earn the Certificate, graduate students must complete a minimum of 13 graduate credits, all of which must be taken for a letter grade. A minimum of seven (7) of the 13 credits must be ENGE courses. Students may request to the ENGE Graduate Committee that other courses be added to the Pedagogy List and/or the Elective List.

#### *Seven (7) Credits of Required Core Courses:*

**ENGE 5014:** Foundations of Engineering Education (3 credits)

**ENGE 5504:** Practicum in the Engineering Classroom (1 credit)

**GRAD 5104:** Preparing the Future Professoriate (3 credits)

#### *Minimum of Three (3) Credits from the Pedagogy List:*

**GRAD 5114:** Pedagogical Practices in Contemporary Contexts (3 credits)

**ENGE 5024:** Design in Engineering Education and Practice (3 credits)

**ENGE 5204:** Design of Laboratory Courses for Engineering Education (3 credits)

**ENGE 5404:** Assessment Techniques in Engineering Education (3 credits)

#### *Maximum of Three (3) Credits from the Elective List:*

##### *Recommended electives related to teaching:*

**EDCI 5114:** Advanced Educational Psychology (3 credits)

**EDCI 5164:** Principles of Instructional Design (3 credits)

**EDCI 5604:** Distance Education (3 credits)

**EDCI 6644:** College Teaching (3 credits)

**GRAD 5004:** GTA Workshop (1 credits)

**GRAD 5984:** Critically Engaged Teaching with Advanced Technology (3 credits)

**STS 6614:** Advanced Topics in Technology Studies (Engineering only) (3 credits)

**ELPS 6424:** Institutional Effectiveness & Outcome Assessment in Higher Education (3 credits)

##### *Other electives (more research-focused) that we will also accept toward the Certificate:*

**ENGE 5604:** Engineering Education Research Methods (3 credits)

**EDRE 5404:** Foundations of Educational Research & Evaluation (3 credits)

**EDRE 6605-6606:** Quantitative Research Methods in Education I & II (3 credits each)

**EDRE 6614:** Qualitative Methods in Educational Research (3 credits)

## **Application**

To apply for the Engineering Education Graduate Certificate, please visit the Graduate School's Certificate website:

[http://graduateschool.vt.edu/graduate\\_catalog/certificate.htm?certificateID=certificateId\\_12](http://graduateschool.vt.edu/graduate_catalog/certificate.htm?certificateID=certificateId_12)

## **ENGINEERING EDUCATION PhD DEGREE**

### **Goals and Objectives**

This program responds to the need, in Virginia and around the world, for more and better research into engineering education and more and better teaching of engineering at all levels. Engineering researchers and educators must be better prepared to address a more diverse group of students, from levels in middle school through doctoral study, and to generate new knowledge in the field of learning in an engineering context.

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

- Conduct and direct research in engineering education
- Develop, review, and critique effective research designs
- Effectively teach engineering subjects
- Design and assess engineering courses
- Address critical issues facing engineering education

### **Engineering Education PhD 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:

- Minimum of Thirty (30) Credits of Dissertation  
Three (3) Credits of Quantitative or Qualitative Research Methods (different from the specialty area chosen in ENGE 5714: Topics in Engineering Education Research: Advanced Research Methods)
- Nine (9) Credits of Education (in the School of Education)
- Fifteen (15) Credits of non-ENGE Engineering Coursework
- Twelve (12) Credits of Engineering Education Core Coursework:

**ENGE 5014:** Foundations of Engineering Education (3 credits)

**ENGE 5404:** Assessment Techniques in Engineering Education (3 credits)

**ENGE 5504:** Practicum in The Engineering Classroom (minimum 3 credits)

**ENGE 5604:** Engineering Education Research Methods (3 credits)

**ENGE 5714:** Topics in Engineering Education Research: Advanced Research Methods (3 credits)

- Six (6) Credits of Electives: (5000 or 6000 level coursework in ENGE or other discipline supporting student's research concentration)

### Additional Information

- Normally the student will have no more than nine (9) credits among 5974 and 5984 independent study/special study courses
- 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)
- 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
- Four semesters of ENGE 5704: Engineering Education Graduate Seminar is required. It is recommended that students complete this requirement in their first two years. Although enrollment is not required beyond four semesters, all graduate students are expected to regularly attend seminar and each student will be accountable to his or her advisor for doing so.

### **Timeline and Progress to Degree**

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 timeline for completing the requirements is presented in Table 1.

Table 1. Suggested progress-to-degree timeline.

<b>Activity</b>	<b>Time Frame</b>
Select an Advisor	Semester 1 – 4
Complete Coursework	Semester 2 – 4
Qualifying Examination	Semester 2 – 4
Select Committee	Semester 2 – 5
Plan of Study*	Semester 2 – 5
Preliminary Examination**	Semester 3 – 6
Research Proposal*	Semester 4 – 7
Research Progress Report*	Semester 5 – 9
Final Examination or Dissertation Defense **	Semester 6 - 10

\*Form required by department and/or graduate school

\*\* Scheduled through the graduate school online registration form

### **Graduate Advisor Selection**

The first step in defining the plan of study is the selection of a graduate advisor. For students pursuing the PhD the advisor must be a member of the ENGE teaching faculty (or an Affiliated Faculty Member) and should have particular expertise in the area of research the student intends to pursue. Graduate School policy includes provisions to change advisor, if necessary, after filing the plan of study. In all cases, the faculty member must give his/her consent to serve in the capacity of graduate advisor. The ADH for Graduate Programs will approve the Plan of Study.

To allow ENGE PhD students' sufficient time to develop their research interests, the Department encourages prospective and new students to meet with as many of the ENGE faculty as possible (at least three) before selecting an advisor. Considerations should include research interests, work styles, personalities, and funding opportunities. The plan of study (which requires an advisor and committee) is due at the end of the semester in which the student passes the Qualifying Examination. Incoming students who have not selected an advisor will be assigned provisionally to the ADH for Graduate Programs or another member of the Graduate Committee, but a final advisor decision must be made before filing the plan of study. Recommendations for advisor selection in tandem with the recruiting process is outlined below:

### ***Background***

Faculty and students have expressed a need for a more transparent process of graduate students selecting advisors. Several issues are involved:

1. Students should be given the ultimate power to choose their advisor *and* to change their mind.
2. Students should not be required to select their advisor too soon. The department advocates a "shop around" approach to encourage students to identify advisors with both the appropriate research and work style.
3. Students are funded by various means, including GTAs, GRAs, fellowships, other programs at VT, and self-funding.
4. Faculty should be aware of the applicant pool and each applicant's advisor status.
5. Faculty should have the opportunity to interact with each student before the student selects an advisor.
6. Graduate Program should be able to depend on faculty to participate in the recruiting process.
7. Graduate Program should be able to depend on faculty to participate in the admission process.

### ***Recruiting***

Faculty will be informed of recruiting efforts and asked to participate. Such efforts may include department open houses, visits to regional schools, and direct correspondence with promising candidates. These efforts occur during both fall and spring semesters, and some offers may take place during the summer.

### ***Admissions***

*Step 1, Reviewing Applications:* Faculty will be asked to review student applications, using the Graduate School's electronic system:

<https://gradapp.stl.vt.edu/pages/login.php?r=s>

Once an application is complete, faculty will be given 2 weeks to complete reviews. The department will provide a list of guidelines for reviews, which consists of answering the following questions:

1. Does this application provide sufficient evidence of skills required to succeed in an Engineering Education PhD program?

2. Does the student's approach and research goals fit those of the program?
3. Would you agree to advise this student or serve on their dissertation committee?
4. Do you want to offer this student funding?
5. Do the student's application materials provide evidence that the student is qualified to be a GTA in the ENGE first-year program?

*Step 2, Admitting Students:* When at least five faculty members have submitted reviews, the graduate committee will determine whether the student should be admitted. If the vote is positive, the Graduate School will be notified and will subsequently send out a general letter of acceptance to the student. At this point, the ENGE Graduate Program will also send out an email of congratulations informing the student that an offer of financial support will soon follow. If the vote is negative, the Graduate School will send out a letter rejecting the student. Faculty who participated in the application review will be notified of these results.

### ***Offers***

*Step 1, Contacting and negotiating with the student:* When a student has been accepted, the ENGE Graduate Program will send an email to the faculty who participated in the application review, providing them a 2-week period in which to contact the ADH for Graduate Programs and then the student candidate if they wish to offer the student a GRA. If we are early in the recruiting season, we can provide more time; if we are late, then the process may have a tighter deadline. Faculty are encouraged to "reply all" to the Program's email in order to promote transparency about the process. Multiple faculty are encouraged to contact the student at this point. If appropriate, the ADH for Graduate Programs or the Department Head (if the ADH for Graduate Programs is actively recruiting the student) will also contact the student to provide an objective, "third party" resource for the student. If a student is accepted to the program but does not receive a GRA, the Program will offer the student a GTA.

As noted above, the process of selecting an advisor ultimately rests in the student's hands, and students and advisors both retain the right to renegotiate relationships as work styles and research interests develop.

*Step 2, Sending an offer:* Once an offer has been settled verbally, the Graduate Coordinator will draft an official offer letter to send to the student on behalf of the Graduate Program and, if applicable, the supporting faculty member.

### ***Reporting Results***

The results of each recruiting effort will be reported out to faculty on a monthly basis or as needed.

### **Changing Advisors**

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/forms/academics/Change\\_of\\_Committee-Advisor.pdf](http://graduateschool.vt.edu/forms/academics/Change_of_Committee-Advisor.pdf)

### **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 his/her advisor in identifying faculty who might serve on the committee. The committee should be composed of those faculty members who can best assist the student in completing his/her 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; beyond the advisor the committee should be composed of a minimum of three EngE faculty and one member outside of the Department. Affiliate Faculty can count as either internal or external to the department. The Graduate School requires that at least four members hold PhDs.

Committee members are expected to attend meetings as a collective body. Under unusual circumstances a member of the committee may attend a meeting by video or telephone connection. However, the student's advisor must be physically present at all such meetings (unless on research leave or similar distant and extended assignment). Faculty participation on graduate student committees is considered to be an important part of ENGE faculty responsibilities. To this end, the ENGE faculty is 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 his or her 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 Dissertation Reading Committee. This document should:

1. List major components of expected research, and
2. List committee members and how their areas of expertise relate to these research components

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, please also include the Graduate School's required form for University registration of non-tenure track and non-VT faculty members:

[http://graduateschool.vt.edu/forms/academics/Grad\\_Progr\\_Fac\\_Addl\\_Members.doc](http://graduateschool.vt.edu/forms/academics/Grad_Progr_Fac_Addl_Members.doc)

### **Plan of Study**

After identifying a graduate advisor and Graduate Committee, a student defines his/her plan of study in consultation with his/her advisor. The courses listed on the plan of study must include, but are not limited to, all courses required for the PhD. A plan of study is required of all students pursuing graduate degrees at Virginia Tech. The PhD Plan of Study form can be found on the [ENGE Grads Scholar](#) website and includes the information below.

1. List of courses to be completed in the course of degree completion, including the semester and year in which each will be taken.
2. The names and signatures of each member of the student's graduate advisory committee.
3. Justification for each member's inclusion on the advisory committee.



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 3<sup>rd</sup> academic semester as suggested by the Graduate School and no later than the end of the semester in which the qualifying exam is passed. An extension may be granted under extenuating circumstances with written permission from the ADH for Graduate Programs.

The Graduate School has rules on transfer credit. As much as 50 percent of the graded credit hours beyond the baccalaureate for the doctorate, obtained at an accredited institution, may be considered for transfer toward the degree. All such credits 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 be acceptable to the student's advisory committee and 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:

[http://graduateschool.vt.edu/forms/academics/course\\_justification\\_request\\_4\\_2014.pdf](http://graduateschool.vt.edu/forms/academics/course_justification_request_4_2014.pdf)

Transferred courses count only as credit hours and are not included in calculation of the GPA.

In addition to a listing of courses, the student should write a justification for the inclusion of each member of the committee stating the qualifications each member brings relative to the student's research effort. The committee justification should be attached to the plan of study. 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 Graduate Program Coordinator 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:

1. Qualifying Examination\*
2. Preliminary Examination
3. PhD Research Proposal
4. Progress Report
5. Final Examination (Defense)

*\*The ENGE Graduate Committee administers the Qualifying Examination, while the student's advisory committee administers all others.*

Additionally, all students are required to create an electronic portfolio (e-portfolio) throughout their PhD experience as part of the departmental annual review process. Failure to complete this requirement in a timely manner may result in loss of funding and/or a hold on the student's account.

## **Qualifying Examination**

The qualifying exam serves the purposes of a) continual assessment of program and core courses, b) evaluation of student learning outcomes; and c) evaluation of student preparedness for doctoral study. This examination assesses the student's understanding of the field of engineering education and the major theoretical concepts, applied issues, and means of inquiry for undertaking research in the field. It is a 10.5-day, take-home, written exam, with three questions, each based on one of the core courses, Foundations, Research Methods, and Assessment. The questions are designed so that students can use the readings from the course they completed to write an effective response. Aside from supplemental readings that may be provided with exam questions, students should be able to address each exam question without going beyond readings assigned in their course. Students with an "incomplete" in any of these three core courses will not be permitted to attempt the exam until the "incomplete" is resolved and a passing grade earned.

Students entering the ENGE PhD with a technical Master's degree are encouraged to complete all ENGE core courses in their first year. Students entering without technical graduate-level coursework are strongly encouraged to complete at least two core courses taught by ENGE in their first year and the rest of the core courses the following year. Early exposure to ENGE content, faculty, and students is important both to reinforce the decision to pursue ENGE and to build community within the program.

Each student will be allowed two attempts to pass the Qualifying Examination. The timeline for passing the Examination is as follows: The Examination will be offered each semester, before classes start. The dates of the fall and spring Examinations will be fixed and announced at the start of the school year. Students must make their first attempt by the end of their second year of graduate enrollment in Engineering Education. For example, if a student starts classes during a fall semester they must take the exam by the end of the second spring semester; if the student does not pass, he or she is allowed one additional attempt to pass the failed portion (allowing 3.5 days per question repeated). The student is not required to make a second attempt during the next offering but it must be within two offerings of the failed attempt. Students who fail to pass the Examination will be ineligible for a Doctoral degree from the Department of Engineering Education. Failing to respond to a question counts as a failure on that question. The Qualifying Examination must be completed before the Preliminary Examination.

If a student fails the exam, she/he is encouraged to speak with his/her advisor, the current course instructor, the instructor who last taught the course, and/or the ADH for Graduate Programs to seek advice on making a second attempt. The Graduate School permits students to appeal; he/she should speak with his/her advisor. If the ADA for Graduate Programs is serving as the advisor, the student will need to find a member of the graduate faculty willing to serve as an advocate. The student and advisor/advocate will prepare a written appeal to be submitted to the ADH for Graduate Programs. The ADH and Graduate Committee will determine the appropriate course of action for addressing the appeal.

Extensions on response submission will only be granted under extraordinary circumstances in consultation with the Department Graduate Committee and/or Department Head. Students with

disabilities documented by the SSD office that wish to seek accommodation on this Examination or any other listed above must submit their request no less than 30 days prior to the start of the Examination. However, it should be noted that accommodations for take-home Examinations are generally not applicable. Therefore, special exceptions are made at the discretion of the Graduate Committee. Please see the following website:  
<http://www.ssd.vt.edu/testingaccommfaculty.htm> - answer12

Rubrics and examples of Examination questions from previous Examinations are available on the [ENGE Grads Scholar](#) website.

### Qualifying Exam Procedure

1. An invitation email is sent to eligible students, asking them to confirm whether they intend to take the exams.
2. The ADH for Graduate Programs assigns faculty in teams of two, with a third faculty member as alternate/backup, on a rotating basis. These three faculty members write an exam question. All faculty members then have the opportunity to review and revise the questions prior to the exam start date.
3. Questions are distributed by email to students. Students have 10.5 days to complete all three questions.
4. During the exam, the ADH for Graduate Programs fields all questions from students and obtains answers from faculty members as needed. Answers are anonymized and reported to all students taking the exam. Each student's identity is protected until the very end of the process, after all exams have been rated.
5. When exams are completed, student responses are distributed to the faculty teams for rating, using rubrics available on the ENGE Grads Scholar site. Faculty should be given at least two full weeks to read and review responses. Exams are rated on a 3-point scale: Fail, Pass, High Pass. Additionally, faculty are responsible for writing feedback for the students on each response (300 words minimum).
6. If an exam response is failed, or the raters disagree, then the third rater on the team reads the response to help make a sure judgment. If an exam response is still deemed failed or in debate, this response will be sent to all graduate faculty for review at the final results meeting.
7. When teams have completed exam rating, all graduate faculty members meet to discuss results and make final decisions on scores. In addition, faculty members recommend possible improvements for the curriculum, the program, and/or the qualifying exam process itself.
8. Finally, the Graduate Coordinator compiles all scores and feedback and the ADH for Graduate Programs emails the results to each student.

### **Preliminary Examination**

The Preliminary Examination in Engineering Education is a vital and required step towards student 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 in earnest.

While the Department administers the Qualifying Examination, Preliminary Examinations must be scheduled through The Graduate School. This document supplements Graduate School policies listed in the Graduate Catalog:

[http://graduateschool.vt.edu/graduate\\_catalog/policies.htm?policy=002d14432c654287012c6542e3630013](http://graduateschool.vt.edu/graduate_catalog/policies.htm?policy=002d14432c654287012c6542e3630013).

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.

The Examination includes both written and oral parts for ENGE PhD students. The written portion of the Examination is completed over a total of 14 days of writing. A common format is approximately three questions related to the research area of interest to the student, based on a reading list developed jointly by the student and his or her committee. 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.

The Preliminary Examination is to be solely the work of the PhD candidate and no outside assistance from other individuals is allowed, to include 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.

The student's advisory committee administers the Preliminary Examination. 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. All members of the student's advisory committee must attend the oral portion of the Examination, at least virtually via teleconference. If performance on the Preliminary Examination is unsatisfactory, one full semester must lapse (15 weeks) before the Examination is administered a second time. Students failing the Preliminary Examination twice will be dismissed from the program. The result of the Examination is recorded through the ESS on the day of the oral portion of the Examination. Each member of the student's advisory committee 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.

The oral examination portion of preliminary examination scheduling will be processed digitally through Electronic Signature Approval System (ESS) at

<https://gradexam.stl.vt.edu/pages/login.php>. 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 <<http://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 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 building room 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 email.

### **Research Proposal**

To initiate the research effort the student is required to prepare a research proposal that describes the background, purpose, and methods of the research, the outcome anticipated, and the contribution to the field. 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). The student should consult with his or her committee regarding expectations for length, scope and format. The signatures of each committee member on the proposal approval form signify approval of the proposed research effort (see ENGE Grads Scholar site for the form).

This form is delivered to the ENGE Graduate Program Coordinator for inclusion in the student's academic record. A student pursuing a PhD degree 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 technical journal. Thus, the writing style, grammar, and spelling of the proposal and dissertation should reflect a high level of skill in written communication.

### **Progress Report**

Between the research proposal and the Final Examination the student is required to provide at least one progress report to his/her advisory committee at a meeting where all committee members are present. 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. The advisory committee signs the progress report form (see ENGE Grads Scholar site) and this form is delivered to the ENGE Graduate Coordinator for inclusion in the student's academic record.

### **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. The Final Examination is a requirement of the Graduate School and must be administered during a semester in which the student is registered.

In order to schedule a Final Examination, *the student must submit their dissertation manuscript to their committee four weeks prior to the exam*. According to the Graduate School, scheduling requires the committee to have read the document before scheduling the defense, and ENGE departmental policy requires that faculty are given two weeks to read documents. The Graduate School policy states:

For scheduling of the **Final Examination**, **Thesis Master's** and **Ph.D. students** must have the thesis/dissertation ready for defense (as judged by Advisory Committee members **having read the document** and signed the examination scheduling request) and 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.

[http://graduateschool.vt.edu/graduate\\_catalog/policies.htm?policy=002d14432c654287012c6542e3630013](http://graduateschool.vt.edu/graduate_catalog/policies.htm?policy=002d14432c654287012c6542e3630013)

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.

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 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. In addition, the student completes an exit survey form and a graduate information form that is provided by the ENGE Graduate Coordinator.

### **Dissertation**

The dissertation must be submitted to the student's advisory committee at least four weeks prior to the Final Examination. The dissertation must be approved by all members of a student's advisory committee, usually upon successful completion of the Final Examination. 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. A successful candidate is allowed a maximum of one negative vote.



Dissertations must be filed and approved electronically with the Graduate School through the Electronic Thesis and Dissertation (ETD) system:

[http://graduateschool.vt.edu/graduate\\_catalog/policies.htm?policy=002d14432c654287012c6542e3720025](http://graduateschool.vt.edu/graduate_catalog/policies.htm?policy=002d14432c654287012c6542e3720025)

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.

### **ENGE Graduate Faculty**

Numbers in parentheses indicate year of first tenure-track appointment at Virginia Tech. More detailed information can be found about ENGE faculty at:

[http://www.enge.vt.edu/People/faculty\\_alpha.html](http://www.enge.vt.edu/People/faculty_alpha.html)

Stephanie Adams | Professor, Department Head (2011), PhD, Interdisciplinary Engineering, Texas A&M

Diana Bairaktarova | Assistant Professor (2015), PhD, Engineering Education, Purdue University

Richard M. Goff | Associate Professor, Assistant Department Head (1996), PhD, Aerospace Engineering, Virginia Tech

Jacob Grohs | Assistant Professor (2015), PhD, Engineering Science & Mechanics, Virginia Tech

David Knight | Assistant Professor (2013), PhD, Higher Education, Pennsylvania State University

Walter Lee | Assistant Professor (2015), PhD, Engineering Education, Virginia Tech

Vinod K. Lohani | Professor (1998), PhD, Civil Engineering, Virginia Tech

Holly Matusovich | Assistant Professor (2009), PhD, Engineering Education, Purdue University

Lisa D. McNair | Associate Professor (2005), PhD, Linguistics, University of Chicago

Marie C. Paretto | Associate Professor (2004), PhD, English, University of Wisconsin, Madison

Kenneth Reid | Associate Professor (2014), PhD, Engineering Education, Purdue University

Donna M. Riley | Professor (2014), PhD, Engineering and Public Policy, Carnegie Mellon University

Bevlee A. Watford | Professor (1992), PhD, Industrial & Systems Engineering, Virginia Tech

### **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.

### **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).

## APPENDIX: ENGE DEPARTMENT FORMS

### Summary of Forms

Forms are required by both the Graduate School and the ENGE Department. A listing of the most common required forms is summarized in the following Table.

Form	Graduate School (for current form)	ENGE Dept. (for current form)
Plan of Study	X	
Preliminary Examination Form	X	
Change of Advisory Committee Membership	X	
Petition to ENGE Graduate Committee for Course Requirement Substitution		X
Course Justification Request	X	
Proposal Approval Meeting		X
Progress Meeting Form		X
Final Examination Form	X	
ENGE Student Post Final Examination Survey		X
Exit Survey Form		X
Graduate Information Form		X
Re-Admission to Graduate School	X	

### Graduate School Forms

Graduate School forms referred to in this manual can be obtained online at the following website:

<http://graduateschool.vt.edu/academics/forms>

### ENGE Department Forms

Internal ENGE forms referred to in this manual can be obtained online at the Student Resource section on the Engineering Education website:

1. PhD Plan of Study Mandatory Addendum
2. Petition to Waive Course Requirement by Substitution
3. Dissertation Proposal
4. Progress Meeting
5. ENGE Graduation Information

\*An addendum to the Plan of Study (approximately one page) is required that contains the contribution and qualification of each committee member and reasons for his/her selection.

When the ENGE Department forms are signed, they should be returned to the ENGE Graduate Coordinator immediately. Some option areas have a checklist available for courses and requirements specific to that option area and are not included in this Appendix. Other ENGE Department forms may be added, and they can be obtained from the ENGE Graduate Coordinator.



## Qualifying Exam Scoring Rubric for Writing (06 May 2014)

Outcome*	Fail	Pass	High Pass	Comments
Effectively communicate course learning outcomes in writing	<p>Writing does not reflect competence with appropriate academic discourse. Includes two or more of the following problems:</p> <ul style="list-style-type: none"> <li>• lack of clear thesis</li> <li>• weak or ineffective organizational structure</li> <li>• lack of coherence within paragraphs</li> <li>• lack of logical reasoning and clear transitions between ideas</li> <li>• significant errors in use of standard academic English</li> <li>• significant errors in use of APA style (citations as well as overall format)</li> </ul>	<p>Writing demonstrates basic competence with academic discourse appropriate to engineering education, including all of the following:</p> <ul style="list-style-type: none"> <li>• clear thesis appropriate to task and context</li> <li>• organization that supports thesis</li> <li>• coherent paragraph structure</li> <li>• logical chain of reasoning and clear transitions between ideas</li> <li>• only minor errors in use of standard academic English</li> <li>• only minor errors in use of APA style (citations as well as overall format)</li> </ul>	<p>Writing demonstrates mastery of academic discourse appropriate to engineering education, including one or more of the following:</p> <ul style="list-style-type: none"> <li>• particularly insightful thesis that reaches beyond obvious claims</li> <li>• sophisticated organization that reflects writer's control over ideas</li> <li>• chain of reasoning and transitions among ideas are particularly lucid or sophisticated</li> <li>• free of errors in both standard academic English and use of APA style</li> </ul>	

\*This outcome will be assessed for every Qualifier Exam response.

## Foundations Qualifying Exam Scoring Rubric (06 May 2014)

<b>Outcome*</b>	<b>Fail</b>	<b>Pass</b>	<b>High Pass</b>	<b>Comments</b>
Explain a variety of theories relevant to engineering education, (e.g., learning, motivation, identity, organizations, change)	Student tries to explain some concepts, but overlooks critical details and/or demonstrates one or more conceptual errors about theories or their relevance. Essay is vague or incomplete in various segments.	Student accurately explains a variety of theories available from course content to address exam question. Details and facts presented provide an adequate presentation of expected level of subject matter knowledge.	Student thoroughly and accurately explains all major points. Student demonstrates deep understanding of the subject matter available from course content to address the exam question.	
Apply theories to inform engineering education curriculum design	Student applies points and concepts incompletely and/or incorrectly.	Student applies relevant concepts available from course content to address how theories can inform practice.	Student presents an original and thorough approach in applying theories to practice.	
Evaluate the strengths of arguments that link the relevant engineering education literature to specific contexts	Student does not identify/focus on relevant argument(s); does not provide supported basis for evaluation.	Student identifies relevant argument(s) and evaluates key strengths and weaknesses.	Student displays an advanced level of critical thinking in identifying and evaluating arguments in support of a specific context.	
Synthesize literature relevant to engineering education to build an argument that goes beyond the conclusions of the cited sources	Student does not clearly introduce a focused thesis. Student presents concepts in isolation, and does not present a logical sequencing of ideas.	Student clearly defines thesis, with statements helping to support the key focus of the prompt. While thesis helps to guide the development of the assignment, linkages between statements are not clearly made.	Student clearly defines thesis with statements helping to support the key focus of the prompt. Student builds upon their thesis with well-documented and logically sequenced supporting facts, figures, and/or statements.	

\*Not all outcomes may be assessed on each offering of the exam.

**Research Methods Qualifying Exam Scoring Rubric (06 May 2014)**

<b>Outcome*</b>	<b>Fail</b>	<b>Pass</b>	<b>High Pass</b>	<b>Comments</b>
Articulate strengths and weaknesses of research methods in relation to research questions	Student demonstrates one or more conceptual errors about the alignment of research questions with appropriate methods (e.g., fitting an appropriate worldview to a particular question). Student does not articulate the tradeoffs between different research methods.	Student sufficiently describes how research questions align with certain research methods. Student identifies one or more tradeoffs between different research methods.	Student clearly and thoroughly explains how research questions align with appropriate methods. Student clearly articulates the tradeoffs between different research methods.	
Design appropriate studies to answer engineering education research questions	Student demonstrates one or more conceptual gaps with regard to research design.	Student appropriately designs a study to address engineering education research questions, sufficiently identifying aspects of the design (e.g., question, worldview, theory, method, sampling, data collection, analysis plan, limitations).	Student demonstrates strong understanding of how to design a study to address engineering education research questions, clearly explaining and justifying aspects of the design.	
Critique engineering education research designs	Student does not identify appropriate evaluation criteria; demonstrates one or more conceptual errors with regard to quality of research.	Student uses acceptable criteria to describe strengths and weaknesses for the exam question context.	Student demonstrates a nuanced understanding in using criteria to describe strengths and weaknesses within the exam question context.	
Describe scholarly ethics and integrity in the conduct and reporting of human subjects engineering education research	Student omits significant ethical/human subjects considerations or demonstrates misunderstandings in these areas.	Student appropriately considers ethical/human subjects considerations.	Student clearly describes ethical/human subjects considerations through the use of definitions and clear examples of similarities and differences.	

\*Not all outcomes may be assessed on each offering of the exam.

## Assessment Qualifying Exam Scoring Rubric (06 May 2014)

<b>Outcome*</b>	<b>Fail</b>	<b>Pass</b>	<b>High Pass</b>	<b>Comments</b>
Critique assessment strategies and plans	Student does not identify appropriate criteria; demonstrates one or more conceptual errors with regard to assessment quality; does not construct judgments about the strengths and weaknesses of the sample studies provided in the context of the exam.	Student identifies acceptable criteria from the literature and constructs valid judgments about the strengths and weaknesses of the sample studies provided in the exam, but specific statements may not totally support the judgments.	Student constructs valid judgments about the strengths and weaknesses of the sample studies provided in the exam and clearly explains how the judgments are based on specific criteria drawn from the literature.	
Compare and contrast current assessment and evaluation practices in engineering education and/or accreditation organizations and policies (e.g., ABET, SACS, Engineers Australia, etc.)	Student does not describe or clearly differentiate assessment and evaluation practices.	Student compares and contrasts assessment and evaluation practices, and clearly identifies similarities and differences.	Student presents a well-balanced, in-depth comparison of assessment and evaluation practices.	
Articulate design methods and/or analytical techniques for assessment at assignment, course and program levels	Student explains methods and/or techniques incompletely and/or incorrectly.	Student accurately explains relevant assessment methods and/or techniques available from course content to address subject of the exam.	Student thoroughly and accurately explains relevant assessment methods and/or techniques available from course content to address subject of the exam`.	

\*Not all outcomes may be assessed on each offering of the exam.