

EngE GRADUATE MANUAL

AY 2009-10

**DEPARTMENT OF ENGINEERING
EDUCATION (EngE)**
Virginia Tech
Blacksburg, VA 24061



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THE EngE GRADUATE PROGRAM

Introduction

The Virginia Tech Department of Engineering Education offers a Graduate Certificate in Engineering Education and a Doctor of Philosophy (Ph.D.) degree in Engineering Education.

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

Department Head: O. Hayden Griffin, Jr.
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Purpose of the Graduate Manual

The Graduate Manual provides detailed 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://www.grads.vt.edu/graduate_catalog/index.jsp) (http://www.grads.vt.edu/graduate_catalog/index.jsp) from Virginia Tech. 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 Dr. Borrego.

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. Further requirements have been established by the Virginia Tech Graduate School, 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 (<http://www.grads.vt.edu/academics/gcat/>) for a complete description of those requirements. The requirements, policies, and procedures set forth herein apply to students joining the EngE Graduate Program on or after Fall Semester 2009. 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

All requirements, policies, and procedures for the EngE Graduate Program are developed by the director and committee with input from students and faculty.

The graduate coordinator serves as administrative assistant to the director of 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.

Application for Admission to the EngE Graduate Program

To expedite the application process, online applications are required. Completed applications should include application for admission to graduate school, three letters of recommendation, a Statement of Purpose (1000 word limit) for graduate study, Graduate Record Examination (GRE) scores, and TOEFL test score for students whose first language is not English. GRE scores are required even for applicants holding other degrees from Virginia Tech. No minimum scores are required beyond those enforced by the Graduate School. 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://www.applyweb.com/apply/vtechg/index.html>

The original GRE and TOEFL scores, as well as official 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 is reviewed by the EngE graduate committee with input from the faculty. The EngE departmental review typically takes between 3 and 4 weeks. The EngE department recommendation is forwarded to the Graduate School for a final decision regarding admission. The decision approving or denying admission is reported to the applicant by the Graduate School.

Graduate Student Orientation

Prior to the start of each fall semester the EngE department conducts an 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 has financial assistance available for qualified graduate students in the form of graduate teaching assistantships (GTA) and graduate research assistantships (GRA). Cunningham Fellowships are also available through the EngE department, College of Engineering and the graduate school. 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. The student is responsible for comprehensive fees (approximately \$750 per semester).

Teaching assistants are expected to be on campus one week prior to the start of classes. The dates of department Ph.D. 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 workshops in the first-year engineering program. GRA awards are made to support research projects that are supervised by EngE faculty; hence, GRAs are awarded by the principal investigator for the research project from which the funding comes. GRA offers should include a discussion of expectations for ongoing funding and advisor relationships. A student receiving a 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 GTA or GRA must carry a course load of at least 12 non-research credit hours per semester, and not more than 18 hours (until required coursework is completed). Students holding less than full-time GTAs or GRAs receive a proportionally smaller stipend and reduced tuition waiver and carry a proportionally lower workload. However, all students on assistantship must be registered for a minimum of 12 non-research hours per semester. In addition, a student holding an assistantship may not otherwise be employed.

Continuing an Assistantship

Continued assistantship support is competitive and dependent on funding available to the department. For students pursuing a PhD., the terms of GTA are guaranteed for three years, 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 member directly supervising the student will evaluate the quality and quantity of work performed and make recommendations for continuance of GTA students to the department head. Similarly, the performance of graduate students is reviewed by the EngE graduate committee, with input from the advisor, at the end of each semester. (See Academic Eligibility)

Students must maintain a B average (3.00) to hold an assistantship. Request for renewal of assistantships will be considered, along with new applications, in the early spring and fall of each year. The EngE graduate committee makes recommendations to the head of EngE, who then awards assistantships for the following semester.

Changing From a GTA to GRA

A student may give up a GTA in favor of a GRA up to three weeks (21 days) before the start of semester classes. Beyond that time, a GTA may be vacated in favor of a GRA only with the consent of the assistant department head and instructor of the course to which the GTA is assigned. 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 GRA or GTA position.

Academic Eligibility

For academic eligibility, a student must maintain a cumulative grade point average of 3.0 or better for all courses taken while in graduate school at Virginia Tech and for all courses transferred for graduate credit at Virginia Tech. The EngE department continuously monitors the progress of each graduate student. At the end of each semester the graduate committee reviews the progress of each EngE graduate student. This review will consider the student's cumulative grade point average and the progress of the student's portfolio. Any student with a cumulative grade point average below 3.0 for his/her last semester of graduate work or whose portfolio is found deficient will be placed on academic probation and may be required to appear before 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.

Graduate Honor System

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. 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.

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://ghs.grads.vt.edu>

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.

GRADUATE CERTIFICATE IN ENGINEERING EDUCATION REQUIREMENTS

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 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. 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) masters 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 Graduate Certificate in Engineering Education program are not required to have an advisor in EngE.

Course Requirements:

To earn the certificate, graduate students must complete a minimum of 13 graduate credits, all of which must have been taken for a letter grade. A minimum of 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.

Required core courses (7 credits):

ENGE 5014: Foundations of Engineering Education (3 cr)
ENGE 5504: Practicum in the Engineering Classroom (1 cr)
GRAD 5104: Preparing the Future Professoriate (3 cr)

A minimum of three (3) credits from the Pedagogy List

GRAD 5114: Pedagogical Practices in Contemporary Contexts (3 cr)
ENGE 5024: Design in Engineering Education and Practice (3 cr)
ENGE 5204: Design of Laboratory Courses for Engineering Education (3 cr)
ENGE 5404: Assessment Techniques in Engineering Education (3 cr)

A maximum of three (3) credits from the Elective List

Recommended electives related to teaching

EDCI 5114: Advanced Educational Psychology (3 cr)
EDCI 5164: Principles of Instructional Design (3 cr)
EDCI 5604: Distance Education (3 cr)
EDCI 6644: College Teaching (3 cr)
GRAD 5004: GTA Workshop (1 cr)
GRAD 5984: Critically Engaged Teaching with Advanced Technology (3 cr)
STS 6614: Advanced Topics in Technology Studies (Engineering only) (3 cr)
ELPS 6424: Institutional Effectiveness & Outcome Assessment in Higher Education (3 cr)

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

ENGE 5604: Engineering Education Research Methods (3 cr) [Sample Syllabus](#)
EDRE 5404: Foundations of Educational Research & Evaluation (3 cr)
EDRE 6605-6606: Quantitative Research Methods in Education I & II (3 cr each)
EDRE 6614: Qualitative Methods in Educational Research (3 cr)

To apply for the Graduate Certificate in Engineering Education:

Please visit the Graduate School's Certificate website,
http://www.grads.vt.edu/forms/academics/certificate_application.pdf.

DOCTOR OF PHILOSOPHY DEGREE REQUIREMENTS

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.

Graduate Advisor

The first step in defining the plan of study is the selection of a graduate advisor. Programs of Study will be approved by the departmental Graduate Director. For students pursuing the Ph.D. the advisor must be a member of the EngE teaching faculty (or an Affiliated Faculty Member with a primary appointment in one of the departments of the Virginia Tech College of Engineering) 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.

To allow EngE Ph.D. students sufficient time to develop their research interests, the department encourages prospective and new students to meet with as many EngE faculty as possible (at least 3) 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 not due until the end of a student's 3rd semester or 30 days after passing the qualifying exam. Incoming students who have not selected an advisor will be assigned provisionally to the Graduate Program Director, but a final advisor decision should be made before filing the plan of study.

Advisory Committee

For the Ph.D. 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 Ph.D. in engineering education, the advisory committee must include a minimum of **four** members, with at least three being members of the EngE teaching faculty. One member of the committee must be from outside the EngE department. The Graduate School requires that at least four members hold Ph.D.'s.

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 assignment for the entire semester). Faculty participation on graduate student committees is considered to be an important part of EngE

faculty responsibilities. To this end, EngE faculty are expected to attend all committee meetings for graduate students they advise or on whose committees they serve.

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 Ph.D. A plan of study is required of all students pursuing graduate degrees at Virginia Tech. The **Appendix** of this manual includes a form for the Ph.D. plan of study, which 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 Ph.D. 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 and absolutely no later than 30 days after passing the qualifying exam.

All EngE graduate students must also take **ENGE 5704, EngE Graduate Seminar**. This seminar must be taken every semester of enrollment.

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. Transferred courses count only as credit hours and are not included in calculation of the GPA. A petition to substitute credit as shown in the **Appendix** must be completed and submitted for approval along with the program of study.

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 director of the graduate program according to the format presented in the **Appendix**. The plan of study is submitted to the graduate program coordinator for electronic approval by the Director of the EngE Graduate Program and the Dean of the Graduate School.

Required Ph.D Milestones and Examinations

All EngE Ph.D. students are required to complete the following milestones in the order listed:

1. Qualifying examination*
2. Preliminary examination
3. Ph.D. research proposal
4. Progress report
5. Final examination (defense)

**The Qualifying examination is administered by the EngE Graduate Committee, while all others are administered by the student's advisory committee.*

Additionally, all students are required to create an electronic portfolio throughout their Ph.D. experience through specific assignments in the seminar course (ENGE 5704).

Qualifying Examination: The qualifying exam in Engineering Education is a vital and required step towards the preparation for undertaking doctoral level research. This exam 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. The qualifying exam is one component required to gain status as a doctoral candidate in the Department of Engineering Education. The Qualifying exam must be completed before the Preliminary Exam. The content of the qualifying exam is based on a standard body of knowledge that should be gained through EngE core courses.

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 exam. The timeline for passing the exam is as follows: students must make their first attempt by the end of their second year of graduate enrollment in Engineering Education; if the student does not pass, he or she is allowed one additional attempt in the following fall or spring semester. Students who fail to pass the exam will be ineligible for a doctoral degree from the Department of Engineering Education. Students who fail to appear for either the first or second attempt will be ineligible for a doctoral degree from the Department of Engineering Education. The exam will be offered each semester, during a two-week period immediately before classes start. The dates of the Fall and Spring exams will be fixed and announced at the start of the school year.

The questions will address different theoretical and methodological issues either as direct questions or as cases where you will be required to apply your understanding. They can have multiple subsections. Examples of research questions will be given well before the examination and subsequent questions for each year will be available online. It is expected that students will have built the required depth by participating in the

required core courses outlined later in this section. The reading list will be given by the graduate committee, and the committee will also oversee the administration of the examination. The reading is meant to prepare students broadly for the exam. The graduate committee will revisit the reading list for the exam each year and will make any necessary changes. There are generally no maximum and minimum page limits or font/space specifications; students are expected to use their own judgment and present a satisfactory response to the questions.

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

While the qualifying exam is administered by the department, Preliminary Exams must be scheduled through The Graduate School. This document supplements Graduate School policies listed in the Graduate Catalog:

http://www.grads.vt.edu/graduate_catalog/poli/UIPo.jsp?p=11. The purpose of this description is to establish common expectations for the Preliminary Exam and Proposal Defense, and to protect both EngE students and faculty.

The examination includes both written and oral parts for ENGE Ph.D. students. The written portion of the examination requires two weeks for completion. A common format is approximately four 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.

Requests to schedule the oral portion of the preliminary examination must be received by the Graduate School at least two weeks prior to the oral examination date. The preliminary examination is to be solely the work of the Ph.D. 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 and one negative vote by a committee member is permitted for successful completion of the examination. 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 on an exam card furnished by the Graduate School to the advisor on the day of the oral portion of the examination. Each member of the student's advisory committee signs the exam card. The original card is delivered to the ENGE Graduate Program Coordinator, who will record the outcome for department recordkeeping and submit it to the Graduate School. Advisory committees reserve the right to alter a plan of study based on performance on the preliminary exam, for example to require coursework addressing a deficiency not serious enough to warrant failure of the exam.

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.

This form is delivered to the ENGE Graduate Program Coordinator for inclusion in the student's academic record. A student pursuing a Ph.D. 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. The advisory committee signs the progress report form shown in the **Appendix** of this manual 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 Ph.D. 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. The final examination must be scheduled through the graduate school at least two weeks prior to its administration. 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 and a copy is provided by the student to the EngE Graduate Coordinator. The result of the examination is

recorded on a form provided by the Graduate School to the faculty advisor on the day of the examination. Upon completion of the examination the student must return this form to the graduate school and a copy to the EngE Graduate Coordinator. 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 two 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 electronically with the Graduate School through the Electronic Thesis and Dissertation (ETD) system. In addition, the advisory committee must sign the appropriate ETD forms for submission to the graduate school. The ETD forms requiring advisory committee signatures are provided to the student by the graduate school. For information on thesis and dissertation preparation, formatting and electronic submission, please see the following website: <http://etd.vt.edu/>

The student, advisor, committee members, and the EngE Graduate Program Director are notified once the ETD process is complete and the document is available online.

Details of the Doctor of Philosophy Program

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

Outline of degree requirements.

An EngE Ph.D 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.

- **30-credits of Dissertation (minimum)**

- **6-credits graduate level Statistics**

To be prepared for the qualifying exam, ENGE PhD students should have at least one semester of basic statistics (distributions and sampling through ANOVA, as in STAT 4604, STAT 5615, or SOC 5204) and one semester of experimental design (as in STAT 5616, SOC 5224, or STAT 5204). Students should also note that most statistics course sequences are fall-spring and are very dependent on each other, so student should plan to start in fall and take the entire sequence (e.g. SOC 5204-5224, EDRE 6605-6606).

Note: STAT 5615-5616 or SOC 5204-5224 recommended for students with no prior statistics coursework. Engineering graduate students with prior statistics course work (e.g. at undergraduate level) may request permission from the instructor to start in a second semester course, such as STAT 5616 or STAT 5204.

- **9 credits in an Education concentration** (coursework in School of Education)

- **15 credits in Engineering (non-EngE) concentration** (coursework)

- **12 credits of coursework in Engineering Education**

- **ENGE 5014:** Foundations of Engineering Education (**3 cr**)
- **ENGE 5404:** Assessment Techniques in Engineering Education (**3cr**)
- **ENGE 5504:** Practicum in The Engineering Classroom (minimum **3 cr**)
- **ENGE 5604:** Engineering Education Research Methods (**3 cr**)

- **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 9 credits among 5974 and 5984 independent study/special study courses
- At least 9 credits will normally be at the 6000 level, relevant to the student's research (do not have to be ENGE courses)
- Up to 30 credits from a master's degree may be counted toward the Ph.D. at the discretion of the student's advisory committee
- ENGE 5704: Engineering Education Graduate Seminar should be taken every semester and does not count toward the 90 credits

Transfer Courses

Coursework taken at other universities may substitute for comparable courses on the student's approved plan of study. The Virginia Tech Graduate School permits a maximum of fifteen semester hours to be transferred from universities participating in the Commonwealth Graduate Engineering Program (CGEP). These universities include the University of Virginia, George Mason University, Virginia Commonwealth University and Old Dominion University. Alternatively six semester hours maximum can be transferred from universities outside this consortium with a maximum of fifteen semester hours taken at universities other than Virginia Tech. Requests for course transfer should be submitted in the form of a letter to the EngE graduate coordinator and should include: a catalog description of each course, textbooks used, grade reports, and a course syllabus. Grades lower than B are not approved for transfer credit.

**DEPARTMENT OF ENGINEERING EDUCATION GRADUATE TEACHING
FACULTY**

Numbers in parentheses indicate year of first tenure-track appointment at Virginia Tech

Maura J. Borrego, Assistant Professor (2004), Ph.D., Materials Science & Engineering, Stanford University.

Richard M. Goff, Associate Professor and Assistant Department Head (1996), Ph.D., Aerospace Engineering, Virginia Tech.

O. Hayden Griffin, Jr., Professor and Department Head (1985), Ph.D., Engineering Mechanics, Virginia Tech.

Aditya Johri, Assistant Professor (2007), Ph.D., Learning Sciences and Technology, Stanford University.

Vinod K. Lohani, Associate Professor (1998), Ph.D., Civil Engineering, Virginia Tech.

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

Lisa D. McNair, Assistant Professor (2005), Ph.D., Linguistics, University of Chicago.

Marie C. Paretti, Assistant Professor (2004), Ph.D., English, University of Wisconsin, Madison.

Janis P. Terpenney, Professor (2004), Ph.D., Industrial & Systems Engineering, Virginia Tech.

Bevlee A. Watford, Professor (1992), Ph.D., Industrial & Systems Engineering, Virginia Tech (Assigned to Dean's Office).

Christopher B. Williams, Assistant Professor (2007), Ph.D., Mechanical Engineering, Georgia Tech.

ADDITIONAL VIRGINIA TECH POLICIES

Equal Opportunities/Affirmative Action Policy (See also 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.

Policy Statement on Sexual Harassment (See also 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 also 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 always is 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 you must:

- use resources only for authorized purposes.
- protect your userid and system from unauthorized use. You are responsible for all activities on your userid 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, userid, 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 userid.
- 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 userid 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.

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	EngE Department
Program of Study		X
Preliminary Exam Form	X	
Change of Advisory Committee Membership	X	
Petition for Course Requirement Substitution		X
Proposal Approval Meeting		X
Progress Meeting Form		X
Final Examination Form	X	
EngE Student Post Final Exam 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://www.grads.vt.edu/common/forms.htm>

EngE Department Forms

The following general EngE Department Forms (Word format available on request) are provided in this Appendix:

1. Ph.D. Program of Study*
2. Petition to Waive Course Requirement by Substitution
3. Proposal Approval Meeting
4. Progress Meeting
5. EngE Graduation Information

* An addendum to the Program 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 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.

DEPARTMENT OF ENGINEERING EDUCATION DISSERTATION PROPOSAL

Mr./Ms.	
---------	--

Has proposed the topic

--

For his or her dissertation research. This topic has been accepted by the student's committee.

Date:	
-------	--

Examining Committee

Note:

It is the responsibility of each student to present at least one report on progress to his or her committee at a meeting where all committee members are present. The meeting must be between the proposal meeting and the final examination.

DEPARTMENT OF ENGINEERING EDUCATION PROGRESS MEETING

Mr./Ms.	
---------	--

Held a progress meeting on his or her thesis or dissertation research on

Date:	
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Examining Committee

Note:

This progress meeting must be sometime between the proposal meeting and the final examination.

EngE GRADUATION INFORMATION

(To be Submitted Immediately After the Final Defense)

Full Name:			
Degree:	Ph.D.	Date:	
Thesis/Report/Dissertation title:			
Major Professor:			
Employer:			
Job Title:			
New Address:			
Phone number:			