POLICIES AND PROCEDURES

FOR GRADUATE STUDENTS IN MECHANICAL ENGINEERING

Updated 8/18/2024

Table of Contents

INTRODUCTION

This handbook provides the basic information needed by students in the Mechanical Engineering (ME) Graduate Program within the Department of Mechanical Engineering at Virginia Tech. This document outlines the program-specific policies and procedures for the ME graduate degree programs, in addition to those of the Graduate School which are published in the Graduate Catalog.

This document is subject to revision. Changes are communicated through the ME Graduate Student Sharepoint site to current graduate students. Please note: the Graduate School has authority to change policies and procedures at any time.

INTERNAL ADMISSIONS PROCEDURES

Special Admissions

Ph.D.

Internal applicants for the Ph.D., who are in the process of completing a master's program in the Mechanical Engineering Graduate Program, must secure a Ph.D. faculty advisor and return the Change of Degree Status form prior to the completion of the M.S. along with a tentative PhD Plan of Study form. Graduate students must return forms to the appropriate Graduate Academic Advisor. Students receive official approval and notification from the Graduate School upon the department's recommendation.

Alternatively, students in the ME M.S. program may transfer into the Direct Ph.D. program. Students must secure a Ph.D. faculty advisor and return the Change of Degree Status form prior to the end of the current semester of enrollment along with a tentative Plan of Study.

M.S. Thesis Option Changes

Students in the ME M.S. non-thesis program may transfer into the thesis track. Students must secure an M.S. faculty advisor and return the Thesis Option Change Request form prior to the end of the current semester of enrollment, along with a tentative Plan of Study.

Students in the ME MEng program may also transfer into the M.S. program. Students must secure an M.S. faculty advisor and return the Change of Degree Status form along with a tentative M.S. Plan of Study form.

VT-TUD Dual Degree Application

Students interested in the VT-TUD dual degree program are encouraged to review the website at https://tud.me.vt.edu/. VT-TUD is only available to students in the MS thesis track. While it is preferred for a student to simultaneously apply to VT and TUD, they may wait to apply during the

first semester. The TUD application will be for the fall semester following the first year of graduate studies in ME at VT. Students must apply and be accepted to both institutions. Due to the complexity of the plan of study, any student interested in this program should make an appointment with a Graduate Academic Advisor to discuss the requirements.

Application Process for Graduate Certificates

Currently Enrolled Students

Students currently enrolled in a degree program should submit the Application for Certificate form to the certificate coordinator. The certificate coordinator will then submit the form to the Graduate School for processing and add the certificate to the student record.

GRADUATE SCHOOL REQUIREMENTS

Graduate Honor Code

The Graduate Honor System establishes academic integrity among graduate students. All incoming graduate students are notified of the honor code upon application to Virginia Tech. By accepting admission, students agree to comply with the Graduate Honor Code, which requires honesty and ethical behavior in all academic pursuits. The Graduate Honor System (GHS) upholds and enforces the Graduate Honor Code. The GHS exists to educate students and faculty about the Graduate Honor Code, to investigate and hear all cases referred to the GHS, and to impose a penalty when a student is found guilty.

The GHS presents information to each incoming class of students during orientation. Find additional information about the GHS by reviewing the Constitution of the Graduate Honor System, which details GHS procedures, rights of accused students, and rights of referrers. The procedures in the Constitution are strictly adhered to in all GHS matters. The Constitution can be found on the Graduate Honor System website .

Ethics and Plagiarism Requirement

Graduate students in the Mechanical Engineering Graduate Program have two options to complete the Ethics Requirement of the Graduate School. Students are encouraged to complete the CITI Program modules because this training is required for participating in research sponsored by several funding agencies.

Collaborative Institutional Training Initiative (CITI) Program

Students complete designated CITI Program Modules and provide certificates of completion to meet the Ethics requirement. CITI RCR training is required for NSF-funded researchers, and additional modules may be assigned depending on the types of research a student pursues. Students should download the CITI instructions provided on the ME Sharepoint site or through the Office of the Vice President for Research. Completion certificates are uploaded to canvas.

RCR Basic Modules:

- Plagiarism (ID 15156)
- Authorship (ID 16597)
- Mentoring (ID 16602)
- Research, Ethics, and Society (ID 15198)
- Collaborative Research (ID 16598)
- Conflicts of Interest (ID 16599)
- Data Management (ID 16600)
- Peer Review (ID 16603)
- Research Involving Human Subjects (ID 13566)

GRAD 5014

GRAD 5014 Academic Integrity and Plagiarism is a two-credit-hour online course. Students may opt to use this course to meet the ethics requirement instead of completing the CITI program.

Inclusion and Diversity Requirement

Graduate students in the Mechanical Engineering Graduate Program have three options to complete the Inclusion and Diversity requirement of the Graduate School.

ENGE 5304

Full-time students on the Blacksburg campus will enroll in ENGE 5304 Graduate Student Success in Multicultural Environments, a 1 credit hour P/F course offered each fall and spring. Students are encouraged to take this course within the first year of study.

ME 5024

Students on the DC-area and Virtual campuses, and other students that require a summer or winter term course, will enroll in ME 5024 Multiculturalism in Engineering. This is an asynchronous, 1 credit hour course offered in fall, winter, spring, and summer terms.

GRAD 5214

ME students on any campus may register for GRAD 5214 Diversity and Inclusion for a Global Society, a 3 credit hour course focusing on inclusion and diversity in research and professional practice. This course is intended for doctoral students.

Transfer Course Credit

Transfer courses are approved when the plan of study is approved by the Graduate School. Transfer courses are reviewed by the student's Advisory Committee and recommended for approval to the Graduate School through the ME Plan of Study form. The POS is submitted by the end of the second semester for full-time master's students and the end of the third semester for full-time doctoral students.

GRADUATE PROGRAMS

Mechanical Engineering Graduate Degree Programs

ME Master of Science Program, Thesis Track (M.S.)

The M.S. program requires a minimum of 30 credit hours of technical coursework and research, and completion of the Graduate School's requirements. The technical courses and research must include the following minimum requirements:

1. 6 hours minimum of ME 5994 Research and Thesis.
2. 20 total hours of approved technical coursework; those hours must meet the following:
    a. 15 hours at the 5000-level or higher
    b. 9 hours of in-department courses (ME, ESM, NSEG)
    c. 3 hours of ME-approved math or statistics courses
3. A maximum of 6 hours of appropriate VT 4000-level courses – *no conjoint courses are allowed, and the courses must be on the Technical Elective list for undergraduates.*
4. A maximum of 6 hours of Special Study and/or Independent Study - *a course description is required for approval towards the degree.*
5. No courses below the 4000-level are accepted for graduate credit.

An estimated date for completing the Final Exam (semester/year) must appear on page 2 of the Plan of Study. All committee signatures are required on page 3 for submission as an official POS ready for final approval and processing. ***Plans of study can be altered later If needed by using the Graduate School's Change of Committee/Advisor Request and/or Plan of Study Change Request forms.***

ME Master of Science Program, Non-Thesis Track (M.S.nt)

The M.S.nt track involves academic coursework and a project & report (ME 5904). This degree option is available online. This program allows a student to pursue a project with confidential data because no publication is required. This program does not require research hours (ME 5994) but does require more technical coursework (24 credit hours).

The M.S.nt requires a minimum of 30 credit hours of technical coursework and research, and completion of the Graduate School's requirements. The technical courses and project hours must include the following minimum requirements:

1. Project & Report (5904): 3-6 hours
    a. ME 5994 and ME 7994 hours may be substituted
2. 24 credit hours of approved technical coursework; those hours must meet the following:
    a. 18 hours at the 5000-level or higher
    b. 9 hours of in-department courses (ME, ESM, NSEG)
    c. 3 hours of ME-approved math or statistics courses
3. A maximum of 6 hours of appropriate 4000-level courses – *no conjoint courses are allowed, and the courses must be on the Technical Elective list for undergraduates.*
4. A maximum of 6 hours of Special Study and/or Independent Study - *a course description is required for approval towards the degree.*
5. No courses below the 4000-level are accepted for graduate credit.

An estimated date for completing the degree requirements (semester/year) must appear on page 2 of the Plan of Study. All committee signatures are required on page 3 for submission as an official plan of study ready for final approval and processing. Students in the MSnt track may opt for a "committee of one" in which the faculty advisor serves as the only committee member. This must be noted when submitting the plan of study. ***Plans of study can be altered later If needed by using the Graduate School's Change of Committee/Advisor Request and/or Plan of Study Change Request forms.***

ME Master of Engineering Program (M.Eng.)

The M.Eng. is a project-based degree intended for students pursuing a non-research career in industry, management, or government. M.Eng. candidates present a final project & report to the Advisory Committee. The M.Eng. requires a minimum of 30 credit hours of technical coursework and project/report, and completion of the Graduate School's requirements. The technical courses and project hours must include the following minimum requirements:

1. Project & Report (5904): 3-6 hours
    a. ME 5994 and ME 7994 hours may be substituted
2. 24 credit hours of approved technical coursework; those hours must meet the following:
    a. 18 hours at the 5000-level or higher

   b. 9 hours of in-department courses (ME, ESM, NSEG)
   c. 3 hours of ME-approved math or statistics courses
3. A maximum of 6 hours of appropriate 4000-level courses – *no conjoint courses are allowed, and the courses must be on the Technical Elective list for undergraduates.*
4. A maximum of 6 hours of Special Study and/or Independent Study - *a course description is required for approval towards the degree.*
5. No courses below the 4000-level are accepted for graduate credit.

An expected date for completing the degree (semester/year) must appear on page 2 of the Plan of Study. All committee signatures are required on page 3 for submission as an official plan of study ready for final approval. Students in the MEng may opt for a "committee of one" in which the faculty advisor serves as the only committee member. This must be noted when submitting the plan of study. ***Plans of study can be altered later If needed by using the Graduate School's Change of Committee/Advisor Request and/or Plan of Study Change Request forms.***

M.Eng. students have the option to be published in the ETD system; therefore, expectations of the written product for the project and report should be established by the faculty advisor and committee at the beginning of the student's graduate program, including publication expectations and any non-disclosure agreements.

ME Doctor of Philosophy Program (Ph.D.)

Doctoral students must complete a minimum of 90 credit hours of technical coursework, including a dissertation, and completion of the Graduate School's requirements. In addition, a minimum of two consecutive semesters of full-time enrollment on a VT campus are required to meet the Ph.D. residency requirement. There are exceptions which require prior approval from the Graduate School. Ph.D. students submit an official Plan of Study before completing the third semester registered as a Ph.D. student. Course work from the M.S. degree may count toward the Ph.D. if approved by the Advisory Committee. Technical courses and research hours must include the following minimum requirements:

1. A minimum of 30 hours of ME 7994, Dissertation Research
2. A minimum of 15 credit hours of in-department courses (ME, ESM, NSEG)
3. At least 27 credit hours of 5000-level or higher courses
4. A maximum of 6 credit hours of 4000-level VT courses*
5. 3 credit hours of approved math/stats courses
6. No more than 12 credit hours of Special Study or Independent Study courses
7. A minimum of 30 credits of graduate-level courses.

*If a course is conjoint, students must take the 5000-level version. Only 4000-level courses on the undergraduate Technical Elective list are allowed. It is highly recommended that students always enroll in 5000-level courses.

For Ph.D. students, an expected date for completing the PhD Qualifying Exam (semester/year) must appear on page 2 of the Plan of Study, as well as the estimated date for the Preliminary Examination & the Final Exam. ***Plans of study can be altered later If needed by using the Graduate School's Change of Committee/Advisor Request and/or Plan of Study Change Request forms.***

Graduate Certificates

Students may earn a graduate certificate in addition to their graduate degree. Credits may not count toward more than two credentials, meaning that a course may not be used for a graduate certificate, master's degree, and PhD. To earn a graduate certificate, fill out the online application for participation in graduate certificate programs. More information is available in the Graduate Catalog.

Nuclear Engineering Graduate Certificate

The Nuclear Engineering Graduate Certificate provides a purposeful, cohesive set of technical electives in nuclear engineering and facilitates networking among faculty, students, and employers in nuclear engineering applications. The certificate is useful in transitioning from a non-nuclear engineering-related job to a nuclear engineering-related job, and it is available in-person and online. A student must take a total of at least 9 credit hours with a letter grade of 'B' or better in every course. NSEG 5114 Nuclear Engineering Fundamentals is required as well as six credit hours from 5000-level or higher courses in the NSEG catalog.

Nuclear Science, Technology, and Policy Graduate Certificate

The Nuclear Science, Technology, and Policy (NSTP) Graduate Certificate is an interdisciplinary credential offered through the Department of Science and Technology in Society, the School of Public and International Affairs, and the Nuclear Engineering Program. This certificate integrates policy and management with nuclear science and technology to prepare students from diverse educational backgrounds for careers managing and leading nuclear policy organizations across a spectrum of safety, security, safeguards, and non-proliferation activities. The Certificate courses offer fundamental knowledge of concepts in nuclear science and technology that are relevant to policy issues and also introduce topics in safety, security, and nonproliferation, which occupy the bulk of government concerns with nuclear issues. Finally, the Certificate will allow students to interact with policymakers in the field through briefings, simulations, and exercises at the Certificate's Northern Virginia locations and institutions, agencies, and other partners in Washington, DC.

The NSTP Certificate is a 12-credit hour credential with 6 hours each of core and elective courses.
Core Courses: 6 credits

1. NSEG 5284, 3 credit hours, fall: Nuclear Nonproliferation, Safeguards, and Security

2. GRAD 5134, 3 credit hours, spring: Interdisciplinary Research, Capstone Course

Elective Courses: 6 credits
Students take one technical and one social science elective. The certificate coordinator can advise interested students on appropriate courses that meet their desired learning goals. A sample of elective courses is found on the NE program website, https://nuclear.ncr.vt.edu/academics/graduate-certificate-in-nuclear-science-technology-and-policy.

International Programs

The Mechanical Engineering Department has international collaborations, at the graduate level, with the Technische Universität Darmstadt (TUD) and the Josef Stefan Institute (JSI) of Slovenia.

VT-TUD Dual Degree Program

The VT-TUD dual degree program allows students to earn two research-based master's degrees by combining coursework and research at both institutions. Students will pursue one thesis and supplement their plan of study with unique courses from each campus.

VT students complete their first year of study on either the Blacksburg or greater Washington, DC, area campuses. The second year and a half are on location in Darmstadt and include options for an individualized summer plan, such as German language study, research, and other opportunities.

TUD students complete their first year in Darmstadt. The second year and a half are at the Blacksburg or greater Washington, DC area VT campus. TUD students will work with the Cranwell International Center and attend ME department orientation prior to the start of the VT fall semester.

More information about the VT-TUD program can be found at https://tud.me.vt.edu/.

JSI Semester in Slovenia

Students taking courses in nuclear engineering have the opportunity to spend a semester in Slovenia working on the TRIGA reactor at the Josef Stefan Institute with adjunct Professor Luka Snoj. Students register for NSEG 5974 Study Abroad/Experimental Reactor Physics for 4 credit hours. For more information, please contact Professor Alireza Haghighat.

ENROLLMENT

Registration

During the academic year (fall and spring), active students register online through Hokie SPA. Students can access Hokie SPA and other software through OneCampus. Academic advisors can force-add students to in-department courses with permission from the instructor. Students must register in the course section offered in their campus (ie Blacksburg, DC area, Virtual).

Continuous Enrollment

Students pursuing any phase of the graduate program are expected to enroll in graduate credits each fall and spring semester during the academic year until all requirements are completed. *No minimum registration is required during the summer*, regardless of the student's financial support. Students may file for a special status to break continuous enrollment (see Leave of Absence and In Absentia policies in the Graduate Catalog).

Summer Semester

Summer registration is not required for continuing students. However, three credit hours during the summer term is considered full-time. Students may continue to conduct research without registering for classes in the summer, and students should discuss research expectations with their faculty advisor. If the student does not register for the summer and is funded, the payroll office deducts FICA taxes during the summer months. If a funded student registers for summer, the faculty advisor must approve the registration and notify the Fiscal Technician if tuition is paid through the assistantship.

Full-time Status

Full-time enrollment for graduate students, for the purposes of tuition and fees, consists of a minimum of nine credit hours each semester (fall & spring semesters), and three credit hours during the summer. However, the Commonwealth of Virginia does not count students as full-time unless they are enrolled for at least 12 credits of graded courses and/or research, and in most academic contexts, 12 credits are considered full time. Graduate research assistants and graduate teaching assistants are required by the Graduate School to register for a minimum of 12 and a maximum of 18 credit-hours during the academic year only. The minimum registration for unsupported students is 3 credit hours unless they are under Start of Semester Defense Exception (SSDE), In Absentia Status Request, or Leave of Absence Request. Students cannot register themselves under SSDE, In Absentia, or Leave of Absence; only the Graduate School can add those registration statuses. Speak with your Graduate Coordinator for more information.

Research and Project & Report Registration

Students registering for project & report, thesis, or dissertation hours must communicate with their faculty advisor before registering to determine the appropriate number of ME 5904, 5994, or 7994 credits. M.S. students should first complete 9-10 hours of ME 5994, and then register in ME 7994 (with permission from the faculty advisor). The number of credits is proportional to the level of activities devoted to the work undertaken. For example, a Ph.D. student working full-time on

dissertation activities and taking no other course work registers for 1 credit hour of seminar and at least 11 hours of ME 7994 each semester.

Required Courses and Course Options

Math and Statistics Courses for Mechanical Engineering

All students must take 3 credit hours of approved courses to meet the departmental mathematics and statistics requirement. Students may petition the Graduate Program Committee to add courses to this list. A comprehensive listing of approved courses is in Appendix C of this handbook.

Seminar Courses

All students are expected to attend seminars to supplement classroom learning. Three series are offered specifically for programs in the department: ESM 5944, ME 5944, and NSEG 5944.

Mechanical Engineering Seminar, ME 5944

All full-time graduate students must enroll in the one credit-hour course, ME 5944 Graduate Seminar, each semester for up to 6 semesters. All course details and requirements are communicated at the beginning of each semester. Questions about attendance and grading should be directed to the instructor.

Special and Independent Study Courses

Special and Independent Studies at the graduate level require a syllabus and method of evaluation. Refer to the Graduate Catalog for the maximum hours of Special Study and/or Independent Study allowed to meet degree requirements. A course description is required for approval towards the degree. Special Study and Independent Study courses are submitted for approval by the instructor. Independent Study courses are designed for individual students.

Transfer Courses

Transfer courses are approved on the Plan of Study by the Advisory Committee. Students can transfer a maximum of 50% of graded course work at the 5000 level or above, from another university in which the student was enrolled as a graduate student. Students who had undergraduate status at the time they took graduate level courses cannot transfer those courses. All courses are required to be graduate level, have a 'B' or better, and have not been used to complete the B.S. degree. Ph.D. students may transfer ME courses, however, they must still complete 15 credits of ME courses from VT. Transfer courses do not appear on the VT transcript. The documentation consists of course descriptions and/or syllabi, in addition to the official transcript. See the Graduate Catalog for more details and procedures to transfer courses.

Course Justification

Graduate courses that were completed more than 5 years before the plan of study is submitted and approved must undergo a review by the Graduate School. This review requires documentation using the Course Justification Request form for approval.

Special Statuses

Candidacy

Ph.D. students who have completed four semesters, are no longer registered in courses, and have passed the Preliminary Exam are eligible for up to four semesters of reduced tuition by requesting Candidacy status. Students should discuss Graduate Candidacy Status Tuition Reduction Request with their faculty advisor. Students must apply each semester. Any student who has passed the preliminary exam and is receiving department funding is expected to apply for candidacy status.

Start of Semester Defense (SSDE)

Students may request a Start of Semester Defense Exception (SSDE) for only 1 credit hour to complete project, thesis, or dissertation requirements at the beginning of the semester. SSDE applies if the defense, final exam, or project review is scheduled within the first five weeks of the academic term or anytime during the summer term. Students in SSDE can defend at any time during the summer and can remain on an assistantship.

To qualify for SSDE, a close to final draft of the project, thesis, or dissertation is written by the student and reviewed and approved by ALL committee members prior to returning the form. The Graduate School will enroll the student for 1 credit hour upon completing the SSDE form at least 3 weeks prior to the defense. Students must take into consideration their student loans and immigration status when applying for SSDE since they are classified as less than half-time.

Leave of Absence and In Absentia

In those extraordinary cases where enrollment is not continued, the student must request a Leave of Absence Request or In Absentia Status Request from the Graduate School. Unless on an approved *in absentia* or leave of absence status, graduate students in degree programs must be registered continuously at VT during the academic year (fall and spring semesters). Students who fail to follow this process will be resigned from the university by the Graduate School and will need to apply for readmission to continue their studies. Unenrolled students do not have access to university facilities. The 'Leave of Absence Request' and 'In Absentia Status Request' forms are available on the Graduate School's forms website and at the Graduate Life Center (GLC).

ACADEMIC PROGRESS

Faculty Advisor and Committee

Faculty Advisor

Advisors are not assigned to students; rather, they are mutual agreements between individual students and professors. Students should meet with faculty to discuss research opportunities and expectations of graduate students under their supervision. Before registration for the second semester of study, each graduate student must confer with the members of the faculty and obtain the agreement of one of them to serve as the faculty advisor. Students are expected to take the initiative in selecting their faculty advisor.

When a student works as a Graduate Research Assistant (GRA), the faculty providing the research funding normally serves as the faculty advisor and Chair of the Advisory Committee. A student's faculty advisor provides guidance in defining a Plan of Study and in monitoring the student's research progress.

Advisory Committee

The student and the faculty advisor jointly select the other members of the Advisory Committee. The student is responsible for securing signatures on the plan of study noting each member's agreement to serve. The faculty advisor is a core faculty member in Mechanical Engineering or an Affiliate Faculty in the ME Department and serves as the Committee Chair. A non-ME Faculty or a non-ME Affiliate faculty can co-chair an ME student with a core ME faculty member.

All Virginia Tech faculty, as well as outside Virginia Tech Advisory Committee members must go through an approval process. The Graduate Committee Service Approval online form is required for these individuals, and the Associate Department Head for Graduate Studies must approve the member on a case by case basis. Once approved, the documentation goes to the Graduate School for final approval.

The Advisory Committee for a master's candidate must consist of a minimum of three faculty members (i.e., Chair and two committee members), at least two of whom are core faculty in the ME Department. The committee can have one member outside the ME Department, but it is not mandatory. The committee composition must consist of a majority of core ME faculty and be at least 2/3 VT faculty.

The Advisory Committee for a Ph.D. candidate normally consists of a minimum of four faculty members (i.e., Chair and three faculty members), at least three of whom are core faculty in the ME Department, and one must be from outside the ME Department. The committee composition must consist of a majority of core ME faculty and be at least 2/3 VT faculty. Affiliate faculty do not qualify

as core ME faculty. Any non-VT committee member approved by the Associate Department Head for Graduate Studies and the Graduate School may serve on the committee. ME affiliates from VT will count towards the 2/3 VT faculty members but not towards the mandatory ME core faculty members. Affiliate faculty or outside ME Department members cannot outnumber the ME faculty on the Advisory Committee.

Student pursuing a project-based or coursework only master's degree may request a committee exception. This exception grants the student permission to have a committee of one, meaning that the faculty advisor serves as the sole advisory committee member. This and other exceptions to the advisory committee membership must be approved by the Associate Department Head of Graduate Studies.

The student and the faculty advisor are responsible for arranging meetings of the Advisory Committee at appropriate times. It is strongly recommended the Advisory Committee meets when the student is starting the research to discuss the undertaking. *At a minimum, each student must arrange a meeting with the Advisory Committee at least once per semester*. The Advisory Committee must meet at least one other time when the student and the Chair feel a significant portion of the research is complete. Each student must meet with their research advisor regularly to discuss the status of the graduate program and research. If a student enrolls in ME 5904, 5994, or 7994 and fails to meet with the faculty advisor in the semester, they will receive no credit for those research hours, significantly decreasing their overall GPA.

Please note, as the degree program proceeds, the Advisory Committee and Plan of Study may change. Copies of the Change of Committee-Advisor and Plan of Study Change forms are available on the Graduate School's forms web site. Once the Plan of Study is approved by the Graduate School, any changes require all committee members (old and new if needed) using the same procedure as submitting the original plan of study. After securing the committee signatures, students must submit these forms to the Graduate Coordinator & Academic Advisor prior to the term the change is to take effect.

Plan of Study

The Graduate School requires an approved Plan of Study by the second semester for a full-time master's student and in the third semester for a full-time doctoral student. The Plan of Study must meet departmental and Graduate School requirements in effect for the designated degree at the time the plan is submitted. A Plan of Study is only official when all courses are listed, and the form is signed by the entire Advisory Committee.

The Plan of Study represents an educational contract between the student and the University. The Graduate School will use the Plan of Study in determining whether or not the student meets the

minimum graduation requirements for a degree. Please note, study plans may change as degree programs proceed. Approval of changes to the Plan of Study are required by all committee members, documented with the Plan of Study Change form. It is important to keep study plans current. Requested changes in plans of study are required by the course-add deadline during the semester for which the change is requested which is normally the first week of classes.

The student and their faculty advisor determine a Plan of Study and receive approval by the Advisory Committee. Blank departmental forms for the Plan of Study are available on the ME/NE Advising course on Canvas. The student makes and keeps a personal copy. The student then gives the signed POS to the Graduate Coordinator & Academic Advisor who submits it for departmental approval. Approved plans of study are entered electronically on the university BANNER system. Ultimately, the plan is acknowledged by the Graduate School and approved on Hokie SPA. After four to six weeks, the student should check that the Graduate School has approved the Plan of Study through either OneCampus or Hokie SPA.

It is highly recommended that graduate students take 5000-level courses instead of 4000. Students may take any 4000-level class included on the undergraduate technical elective list which is not a required undergraduate course (for example, the required senior lab, ME 4006, does not qualify). If a class is offered as a conjoint class (offered at both the 4000 and 5000-level), graduate students must take the 5000-level course. Students must take all graduate degree courses A-F (unless only offered P/F). A Plan of Study is only official when all courses are listed and signed by the entire Advisory Committee.

GRADE REQUIREMENTS

Students must pass all courses on the Plan of Study with a grade of 'C-' or better with an overall GPA of 3.0. Students must repeat any subject with a grade below 'C- '(C minus) if the course is on the Plan of Study. If a student's work is substandard, the ME Department Graduate Program Committee can recommend to the Dean of the Graduate School to dismiss the student from the program.

All courses on the Plan of Study, including supporting courses, must be taken as a letter grade except for those courses offered as P/F only (such as all 5974 courses). Graduate students may take an unlimited number of credit hours of graduate work (5000 or 6000 level) on a P/F basis outside of the department and not on the POS, with the approval of the faculty advisor. ***Auditing courses is not recommended,*** but it is allowed.

Annual Self-Assessment and Evaluation

Once a year, students and faculty advisors meet to formally review the student's progress toward the degree and provide a written record for the student's academic file. The annual self-assessment and evaluation are available to the student in Canvas on the ME/NE Graduate Student Advising course, along with instructions for completing and submitting the document. The student should first

complete a self-assessment. The student should send the assessment to their faculty advisor, and the advisor should complete the evaluation. The final step is a meeting to discuss the final document. At this time, both the student and faculty advisor sign the document. This is in accordance with Policy Memo 229. Students that do not submit an annual evaluation by the deadline posted in Canvas may not be eligible for departmental funding.

Examinations

All students in research-based degrees are required to complete some form of final exam or presentation to earn a degree. Non-thesis students in the M.S.nt and M.Eng. undergo a final review of their coursework which is scheduled through the ESS portal similar to a final exam.

Ph.D. Qualifying Exam

In Mechanical Engineering, the purpose of the Qualifying Examination (QE) is to ensure students have mastered the knowledge and skills necessary to continue doctoral-level research and scholarship. All Ph.D. students must register for and pass the examination as described below.

To register for the ME QE, students must have (1) a faculty advisor and (2) taken two in-department courses with a 3.5 GPA. Students register to sit for the ME QE through the ME/NE Graduate Student Advising course in Canvas. Students should plan to sit for the ME QE in their 5th semester or earlier.

To pass the ME QE, students will either (1) publish a peer-reviewed paper as first author with work conducted at VT under the faculty advisor or (2) write a 5-page research proposal on a specific topic that will be presented and reviewed by a Qualifying Exam Committee.

The complete ME PhD QE Policy is in Appendix D of this handbook.

Ph.D. Preliminary Examination

The Preliminary Examination is an oral presentation given to the student's Advisory Committee. It is strongly recommended that the student prepares a written description of their proposed research in the form of a dissertation prospectus and distributes it to the Advisory Committee one to two weeks in advance of the examination. The purpose of the Preliminary Examination is to determine if the student's research proposal is satisfactory for the Advisory Committee. Therefore, most of the questioning will focus on the material in the dissertation prospectus, although the Committee Chair can modify the examination format at their discretion. The Preliminary Examination is held after the student passes the Ph.D. Qualifying Examination and before the student makes significant progress on the dissertation research. The student must pass it at least six months before the final defense, and at least one-third of the required work (coursework and/or research) must remain after passing the Preliminary Examination.

The Preliminary Examination is scheduled through the Graduate School. ***The Graduate School requires a minimum of two weeks advanced notice to schedule examinations***. Good academic status and an up-to-date Plan of Study, approved by the ME Department and the Graduate School, are required before the Preliminary Examination is scheduled. The Request to Admit Candidate to Preliminary Exam form is available for scheduling the examination on the Graduate School's forms website. This system does NOT reserve a room for the examination. Students must contact ME Support Staff to reserve a room. A proxy can attend in place of an Advisory Committee member who cannot attend the examination. The absent faculty member must approve the Request to Admit the Candidate to the Prelim Exam and indicate the examination grade on behalf of the proxy. The Graduate School will e-mail the Examining Committee to approve the exam. ***The examination CANNOT be conducted if the Chair does not receive notification from the Graduate School that the examination is approved.*** The Examination Committee must log onto the Electronic Signature Approval System (ESS) to record the results immediately after completion of the examination. After passing the Preliminary Exam, students may qualify for the PhD Candidacy status with reduced tuition.

Final Examination

Each research-based degree candidate will take a final examination. MEng and MSnt students will substitute a final evaluation of the student record for the final exam.

A near-final draft of the report/thesis/dissertation is distributed to the committee at least three weeks prior to the final examination. However, the committee can require more time to review the document. Students must review the Degree Completion and Commencement information for deadlines and procedures.

The Final Examination/Evaluation is scheduled through the Graduate School. ***The Graduate School requires a minimum of two weeks advanced notice to schedule examinations.*** Good academic status and an up-to-date Plan of Study, approved by the ME Department and the Graduate School, are required before the Final Examination is scheduled. The Request to Admit Candidate to Final Exam for scheduling the examination is available on the Graduate School's forms website. This system does NOT reserve a room for the examination. Students must contact ME Support Staff to reserve a room if required.

The Examining Committee is approved by the Dean of the Graduate School and normally consists of the members of the student's Advisory Committee, although it is not necessarily so restricted. After approval by the Graduate School, the student, the Graduate Advisor, the Graduate Program Chair, and the Examining Committee members are notified via e-mail approximately 5 days before the examination. A proxy can attend in place of an Advisory Committee member who cannot attend the examination. The absent faculty member must approve the Request to Admit Candidate to Final Exam and indicate the final examination grade on behalf of the proxy. ***The examination CANNOT be conducted if the Chair does not receive notification from the Graduate School that the***

examination is approved. If the e-mail notification has not arrived 2 days prior to the examination, the student must contact the Graduate Advisor and the Graduate School to determine if there is a problem to resolve. Once the exam is complete, the Chair of the Examining Committee inputs the results and sends the appropriate SACS Accreditation form to the Director of Graduate Students.

Generally, the student makes a brief (about 30-50 minutes) presentation to the Examining Committee, highlighting some aspects of the work done. Approximately the first half of the examination is devoted to defending the research document. The second half of the examination can, at the discretion of the Examining Committee, be more general in nature and can draw from the student's background, including coursework.

Attendance to the final examination is open to other faculty members of professorial rank. However, with the agreement of both the candidate and the faculty advisor, others are invited to attend the presentation segment of the examination. Final defense candidates are questioned by members of the Examining Committee and by those faculty or other audience members who are invited by the Examining Committee to participate. The Examining Committee decides whether the student passes or, fails. If a student fails, the Committee will indicate when the candidate may retake the examination. A repeat examination is not scheduled earlier than the beginning of the following semester.

Research

Most full-time graduate students enroll in research courses each semester under the supervision of their faculty advisor. The student and faculty advisor should decide on expectations for research at the beginning of the semester and/or academic year. Students and faculty advisors should meet regularly to review and discuss research progress, and students should be prepared to submit an abstract to the annual department research symposium for graduate students in the spring of each year.

Research culminates in a thesis or dissertation defense. More information about the thesis or dissertation's structure, format, and requirements is under Appendix F.

Project and Report

Students in the M.Eng. and M.S.nt programs will enroll in project and report for 1-6 credit hours. The project and report vary by faculty advisor. Students are encouraged to discuss the specific expectations early on with their faculty advisor on what the project and report will entail (i.e., a written report, an oral presentation, etc.).

Examples of a M.Eng. project and report:

1. Analysis of confidential industry data

2. Application of an existing code to a new discipline
3. White paper on an interdisciplinary science and policy topic
4. Design and present an assessment for a technical protocol
5. Systematically analyze a process for better efficiency and/or improved outcomes

Examples of a M.S.-nt project and report:

1. In-depth literature review of a specific topic of interest
2. Create a web-based tool for a specific problem or question
3. Analysis of confidential or protected research data
4. Design and present an assessment of a new program

DEGREE COMPLETION

Graduation Checklist

Please see https://graduateschool.vt.edu/academics/what-you-need-to-graduate/graduation-requirements.html for the Graduate School's checklist of what you need to graduate. Pay attention to the published deadlines for graduating and participating in Commencement.

Plan of Study

The plan of study should already be submitted and approved by the Graduate School. At least one semester prior to degree completion, students should review it to make sure it is up to date.

Enrollment

Students must be enrolled in a minimum of 3 credit hours in the final semester unless qualified for Start of Semester Defense Exception (SSDE). The SSDE exception only requires 1 credit hour (see Special Status section for details).

Application for Degree (AFD)

The Application for Degree is filled out on Hokie SPA. It is submitted by the deadline listed on the Graduate School's web site. Late submissions will result in the student's name not appearing in the Commencement Bulletin and possible delays receiving the diploma. Review the policies and procedures for completing the degree on the Graduate School's What You Need to Graduate website.

Schedule Your Final Exam

You must schedule your defense date and submit the request at least 2 weeks prior to the actual date.

Submit your Electronic Thesis or Dissertation (ETD)

Upload your final ETD within two weeks of your defense.

RESOURCES

Advising

The Office of the Graduate School Ombudsperson provides additional resources for professional relationships, mediation and advocacy.

The ME Department has a shared advising structure. Students are assigned an academic advisor (also called program coordinator), and students also find a faculty advisor in their technical area of interest. The academic advisor guides students through degree requirements and provides referrals to resources. The faculty advisor provides technical expertise in the chosen discipline and supervises the project, report, and research of the student. The advising team works together to ensure timely degree completion.

ME Academic Advisors maintain advising resources on Canvas and Sharepoint, and they are available for appointments in the Navigate system.

Funding

Funded students are REQUIRED to submit federal and state tax forms and the federal I-9 form PRIOR to beginning work. Proper forms of identification are needed to fill out the I-9 form. Examples include: a valid driver's license, a social security card, a passport and/or a birth certificate. The tax and I-9 forms are usually distributed during the mandatory orientation, but funding may begin at any time. If this is the case, students must fill out all forms with the HR Fiscal Technician.

Students on assistantships and fellowships are required to register for a minimum of 12 credit hours each semester during the academic year. Most students, including funded students, are responsible for paying comprehensive fees and must do so before the Bursar's Office deadline to avoid a late fee penalty. Funded graduate students registered in classes must not wait for a 'corrected' tuition bill before paying the comprehensive fees. Comprehensive fees and Parking Permits are payroll deductible. The Engineering and Capital fees are not payroll deductible. Students may apply for the comprehensive fee payment plan through the bursar's office to spread this expense over the semester.

Internal Funding

Graduate Research Assistantships (GRAs)

Full-time GRAs are employed 20 hours/week on a research project during a specified appointment period. GRAs are required to fulfill their employment obligations without regard to academic terms and holidays. This means they are expected to work an average of twenty hours per week for the duration of the contract.

Graduate Teaching Assistantships (GTAs)

GTAs support the instruction of various courses and laboratories. Some positions may be more administrative in nature.

Full-time GTAs are employed 20 hours/week. GTAs are expected to report to the ME Department starting approximately one week before classes begin and continuing through final exams. All GTAs must successfully complete the Graduate School's mandatory GRAD 5004 GTA Training Workshop once.

Fellowships and Traineeships

Fellowship and traineeship holders are full-time graduate students and have limited assigned university duties specified by the fellowship/traineeship. Fellowship and traineeship holders must associate themselves with ongoing research projects and are treated like others who hold GRA positions. See the Graduate School's Fellowship list.

External Fellowships

Students are encouraged to apply for external funding and will receive notifications via email, Slack, or Canvas for opportunities. These include fellowships through the NSF (National Science Foundation), DOE (Department of Energy), NRC (Nuclear Regulatory Commission), Fulbright, and other sponsors depending on the discipline of study and research.

Scholarships

All students in ME are expected to apply for the ASME (American Society of Mechanical Engineers) and/or ANS (American Nuclear Society) scholarships annually. ***Scholarships in both organizations are open to domestic and international students***. Students must be members of the organization, and one application typically covers several types of monetary awards.

Student Governance

Mechanical Engineering Graduate Student Council (MEGSC)

The MEGSC represents the ME, ESM, and NE graduate students to the department leadership and participates in shared governance at the institutional level through the GPSS (Graduate and

Professional Student Senate). MEGSC maintains a Slack channel for communications, and invitations are distributed via email.

Graduate and Professional Student Senate (GPSS)

The GPSS is the governing body of the on- and off-campus graduate and professional students, and works to improve campus life, scholarly development, and community for its constituency. GPSS has representatives from all campuses, Colleges, and Schools; more information is available at https://gpss.vt.edu/.

APPENDICES

APPENDIX A: DEPARTMENT FORMS & DROP BOXES

All ME department forms are available in the ME/NE Graduate Student Advising Course in Canvas. Please be sure that you have accepted this course and contact your Graduate Coordinator/Academic Advisor if you have questions.

Department forms include:

- Plan of study
- Annual evaluation
- QE registration

Other useful forms found on Canvas or from your advisor:

- Independent study request (COE form)
- Special study request (registrar)
- Grade change form (provided upon request only)
- Comprehensive fee waiver form (bursar)

Drop boxes for specific requirements such as the annual evaluation and CITI training program certificates are also available in Canvas. Students are expected to utilize the Canvas drop box to submit these assignments. All other forms should be completed and emailed to your advisor for review and approval.

APPENDIX B: GRADUATE SCHOOL FORMS

The ME Graduate Advisors process all academic forms for graduate students. An electronic copy of the form is kept in the academic file.

The following forms, listed by category and with descriptions, are available through the Graduate School's forms webpage.

Admissions

	DESCRIPTION
Accelerated UG/GR Degree and Course Designation Request	Apply online to a graduate degree program and then submit this form to the Graduate School to receive graduate degree admission decision and UG/GR status designation.
Application for Admission	Apply through the Graduate School Application Management program. New VT account creation or login with VT account credentials is required.
Application to Graduate Certificate Program	Apply for a graduate certificate while working toward a graduate degree. If you are not working toward a graduate degree, apply online through the Application Management Portal for graduate certificate status.
Application for Readmission	Apply through the Graduate School Application Management program. New VT account creation or login with VT account credentials is required.
Application for Senior Citizen Graduate Admission	Senior citizens (ages 60 and older) use this form to apply for graduate level non-degree-seeking status.
Application for Simultaneous Graduate Degree	Apply for a second, simultaneous degree, if already enrolled in a graduate degree program. You must obtain approval from both academic departments to add the second graduate-level degree.
Application for Visiting Graduate Student Admission	Graduate students at other institutions may apply with this form to enroll in a graduate level course at Virginia Tech.

Enrollment/Registration

	DESCRIPTION
Academic Relief Request (Cook Counseling Center)	Request academic relief due to a psychiatric or psychological problem that has substantially interfered with your ability to meet your academic responsibilities. Relief may include incompletes, course drops, or withdrawal.
Academic Relief Request (Schiffert Health Center)	Request academic relief due to a significant medical problem that has substantially interfered with your ability to meet your academic responsibilities. Relief may include incompletes, course drops, or withdrawal.
Conflict of Interest Agreement	Use this form if you are a VT employee pursuing a graduate degree.

Co-op Application	Visit the co-op program website for detailed information about requirements, application procedure, and link to the online application.
Course Withdrawal Request (Graduate Late Withdrawal)	Drop a graduate course after the drop deadline. Submit this form to your home department, and then return to the Graduate School for approval by the final Friday before the last day of classes.
In -Absentia Status Request	If you are in good standing and, for academic reasons, need to spend an entire fall or spring semester away from campus, request In Absentia Status for work that is directly related to your academic course of study.
Leave of Absence Request	Pause your graduate enrollment and suspend activities associated with coursework or thesis/dissertation research.
Over-enrollment Request	Request permission to enroll in more than 18 credits for a semester. You must be logged into your VT Google account to access the Google form for this request.
Resignation/Withdrawal (to drop all courses)	Use this form to drop all of your classes for a semester. The Graduate School Dean's signature is required after the first day of classes. Submit the form to the Graduate School for the Dean's review and signature. An individual meeting with the Dean is not required, nor necessary.
Start of Semester Defense Exception Request	Request reduced enrollment to defend your thesis or dissertation at the beginning of the semester, if you have fulfilled all requirements, including Advisory Committee review of your thesis or dissertation. Submit this request at least three weeks prior to the exam day, but no later than the Friday of the third week of classes.
Under-enrollment Request	Request an exception to the 12-18 credit enrollment requirement for graduate assistants. Program-level exception requests must be submitted by program chair; individual graduate students may submit a request for case-specific consideration.

Status Changes/Student Record Updates

	DESCRIPTION
Change of Campus Request	Change your VT campus location.
Change of Degree Level Request	Change your degree level from master's to doctoral, doctoral to master's, or master's to master's, within the same major.
Change of Graduate Program Request	Change to a new graduate program at the same degree level. The request requires review and acceptance by the new department, which may request a copy of the original admission application from the Graduate School.
In Absentia Request	If you are in good standing and, for academic reasons, need to spend an entire fall or spring semester away from campus, request In Absentia Status for work that is directly related to your academic course of study.
Leave of Absence Request	Pause your graduate enrollment and suspend activities associated with coursework or thesis/dissertation research.

Name Change/Personal Information Update	Update your legal name, social security number, date of birth, legal sex, confidentiality indicator, or citizenship in official university records. Documentation is required.

Tuition Status Requests

	DESCRIPTION
Graduate Candidacy Status Tuition Reduction Request	Request a tuition discount if you have passed your preliminary exam and completed all required coursework for your plan of study. Other restrictions apply. You must be logged into your VT Google account to access the request form.
In-state Tuition Request for Virginia Residents	Request In-state tuition rates based on being domiciled in Virginia. Supporting documentation demonstrating Virginia as your state of domicile is required. International students in F/J status are not eligible.
K-12 Teacher Reduced Tuition Request	Full-time Virginia school personnel in grades K-12 institutions may request the Virginia School Personnel reduced tuition rate. submit for each academic year of enrollment to recieve the reduced tuition rate.
Senior Citizen Tuition Waiver Request	Graduate students ages 60 and older may request the waiver of tuition and fees. Submit for each semester of enrollment to receive the waiver.

Academic Progress

	DESCRIPTION
Accelerated UG/GR Degree and Course Designation Request	Apply online to a graduate degree program and then submit this form to the Graduate School to receive graduate degree admission decision and UG/GR status designation.
Change of Committee/Advisor Request	Change the membership of your graduate committee if you have a plan of study that has met final Graduate School approval.
Course Justification Request	Provide justification for including course-work older than 5 years at the time of plan of study submission to the Graduate School or readmission to the graduate program.
Final Exam Request for Non-thesis and Ed.S. Candidates	Schedule your final exam (evaluation) through the Graduate School's Signature Approval System. VT login required. Must submit request in no less than two weeks before the proposed exam (evaluation) date.
Final Exam Request for Thesis and Dissertation	Schedule your final exam through the Graduate School's Signature Approval System. VT login required. Must submit request in no less than two weeks before the proposed exam date.
Plan of Study Change Request	Change the courses listed on a plan of study that has met final Graduate School approval.

Preliminary Exam Request for Doctoral Students	Schedule your preliminary exam through the Graduate School Approval System. VT login is required. Must submit request in no less than two weeks before the proposed exam date.
Thesis Option Change Request	Change between the thesis and non-thesis options for a master's degree if you have a plan of study that has met final Graduate School approval.

Graduation

	DESCRIPTION
Commencement Attendance	Access the request form through Hokie Spa, Degree Menu, Graduate Student Degree Menu, Commencement Intentions Form.
Degree or Certificate Conferral Request	Submit your Degree or Certificate Conferral Request online in HokieSPA. If you receive an error, you can initiate the process by completing this pdf form (one form per degree or certificate requested).
Diploma Replacement Request	Order a replacement graduate degree or certificate diploma.
Final Exam Request for Thesis and Dissertation	Schedule your final exam through the Graduate School's Signature Approval System. VT login required. Must submit request in no less than two weeks before the proposed exam date.
Final Exam Request for Non-thesis and Ed.S. Candidates	Schedule your final exam (evaluation) through the Graduate School's Signature Approval System. VT login required. Must submit request in no less than two weeks before the proposed exam (evaluation) date.
International Invitation for Commencement Request	International students may generate an invitation letter for commencement for their family members to seek visitor visas, after submitting Application for Degree and completing the Commencement Attendance Form. Access the request form through Hokie Spa, Graduate Student Degree Menu.
Letter for Degree Completion Request	Request a letter of degree completion through Hokie Spa, Graduate Student Degree Menu, after you have been awarded your degree, but before you receive your diploma.
Thesis/Dissertation (ETD) Approval Request	Request ETD approval through the Graduate School's Signature Approval System. VT login is required. Must submit request in no less than two weeks before the proposed exam date.

APPENDIX C: ME PROGRAM MATH & STATISTICS APPROVED COURSES

The following courses have been approved to meet the math/stats requirement for ME.

Mathematics Courses

All 4000, 5000 or 6000 courses from the Mathematics Department are eligible to fulfill the ME program mathematics requirements except for MATH 4024, 4044, 4334, and courses numbered 46XX and 56XX.

Statistics Courses

Selected 5000 and 6000 level courses from the Statistics Department are eligible to fulfill the ME program mathematics requirements. Those courses are STAT:
5104, -14, -24, -14, -24, -34, -44
5204
5304
5404, -14, -24, -34, -44, -54, -64, -74, -84
5504, -14, -24, -25, -34, -44, -54, -64, -74, -94
5605, -15, -16, --64, 74
6105, -06, -14
6404, -14, -24, -64, -74, -94
6504, -14, -74

Engineering Courses

All courses cross-listed with the Mathematics Department and meeting the above requirements are eligible for graduate mathematics credit. *Any Cardinal Education graduate level Math/Stat course is also acceptable.*

AOE/ESM 4084 Engineering Design Optimization
AOE/MATH 4404 Applied Numerical Methods
AOE 5434G Advanced Intro. to Computational Fluid Dynamics
BMES-5044/BSE-5044/CHE 5044 Engineering Mathematics
ECE 5605-06 Stochastic Signals & Systems
ESM 5734 Intro. to the Finite Element Method
ESM 5744 Variational Methods
ESM 6514 Computational Methods for Viscous Flow
ESM 6734 Finite Element Analysis
ME 5434 Adv. Intro. to Computational Fluid Dynamics
ME 5574/AOE & ECE 5774 Nonlinear Systems Theory
ME 5744 Methods of Mech. Engineering Analysis
ME 5764 Modeling MEMS & NEMS
ME 5774 Intro. to Stochastics

ME 6434 Computational Fluid Dynamics and Heat Transfer
ME 6574 Adaptive Control Systems
ME 6744 Chaos and Nonlinear Dynamics
ME 6984 SS: Feedback Control of Dynamic Legged Locomotion
MSE 5124 Materials Optimization Through Designed Experiments
NSEG 5104 Applied Mathematics for Nuclear Engineers
NSEG 5134 Monte Carlo Particle Transport

APPENDIX D: ME PhD Qualifying Exam Guidelines

Updated on 4/11/2024

Goals of Qualifying Exam

The goals of the Qualifying Exam (QE) include the following:

1) Determine the student's aptitude and ability to perform original and independent research at the doctoral level.

2) Assess the student's ability to review previous work from the literature.

3) Determine the student's ability to understand and apply fundamental concepts in his/her technical area.

Qualifying Exam Procedure

The QE for the ME PhD Program at VT follows a multi-step procedure:

1) First, the student must pass two 5000- or 6000-level courses in the VT ME department with a minimum GPA of 3.5.

2) After passing the above two courses with the minimum GPA, the student will pass the QE if they have one journal paper accepted as the first author from the work done with ME faculty, including the ME-affiliated faculty.

3) In lieu of the journal paper publication, the student can choose to prepare a research proposal (5-page document) on a topic selected by a sub-committee of three (3) ME faculty. The timeline and key events of the QE exam using this route can be found in Appendix A. The student's advisor names two faculty members for the sub-committee (the advisor should confirm their willingness to serve on the committee before submitting their names to the Graduate Office). The Qualifying Exam Committee of the ME department assigns the other member of the sub-committee without consulting the assignee beforehand. None of these professors can be on the student's dissertation committee at the time of the QE exam.

   a. The research proposal option will be administered three times each year: Spring, Summer, and Fall. The ME Department Graduate Office will announce the registration deadline at least three weeks in advance.

   b. The student must register for the research proposal option by the deadline. When submitting the registration form, the student must provide (1) a 100-150 word description of their dissertation research topic and general methodology (e.g., theoretical, computational, and/or experimental), (2) a list of their dissertation committee members, and (3) the name of two QE sub-comittee members selected by their advisor. The registration is considered valid only if all this information is provided.

c. If a student registers for the research proposal option but later forgoes this option (e.g., by not submitting a research proposal or giving the required presentation), the student will receive a Failing grade for the exam. An exception is when a student (a) publishes a journal paper as the first author with ME faculty (or ME-affiliated faculty) after registering for the research proposal option **and** (b) the student provides evidence for satisfying the journal publication requirement to the ME Department Graduate Office within two weeks of the formal acceptance of the journal paper.

4) If a student takes the QE exam through the research proposal route, the following policy applies:

a. The QE sub-committee for the student will have 2 weeks to create a topic description for the student.

b. Once the topic is provided to the student, the student will have 2 weeks to prepare a research proposal. This needs to include a literature review, potential opportunities for future research (gap), challenges to be addressed, etc. A detailed rubric to evaluate this document is provided in Appendix B.

c. The sub-committee that selected the topic will review the research proposal and attend a presentation by the student providing the details of their findings. The subcommittee will ask probing questions to evaluate the student's capability for research, synthesis, critical thinking, and understanding of the fundamental principles of Mechanical Engineering.

d. After the presentation, the student will be excused, and the sub-committee will deliberate if the research proposal document and presentation are suitable to pass the QE. If the student does not pass, the sub-committee will provide a list of additional remedial actions for the student to undertake, including a timeline and guidelines for assessment (for example, pass a specific class with a minimum grade, present the proposal again, rewrite portions of the proposal, etc.).

e. If the remedial action is not met satisfactorily, the sub-committee can provide a second and last opportunity for additional (or repeated) remedial action. After the second attempt, if the remedial action is not passed satisfactorily, the exam will be considered failed, and the student will not be allowed to continue in the ME Ph.D. program.

5) Students are required to pass the QE by the end of their 5th semester in the program.

6) Any of the guidelines at the previous points can be waived/modified by the ADH for Graduate Studies, following a formal request from the student, signed by the student and their research advisor.

Research Proposal Guidelines

Written Document

The objective of the Research Proposal is to communicate how a specific research problem may be investigated. The document is not to exceed 5 pages using 11pt Arial or Times New Roman fonts, 1- inch margins, and single line spacing. The 5-page limitation covers the proposal body text, as well as any figures and tables. The title page and cited references do not count toward the 5-page limit.

A typical document has the following structure:

Title Page: The first page should include name, title, date of submission, and signed academic integrity pledge.

Problem Definition, Literature Review, and Motivation: Introduce the problem to solve within the selected topic. Explain the importance of the problem, review the state of the art, and discuss critical barriers to progress in the field that the proposed project addresses.

Objectives: Statement of the goals/objectives of the proposed research and summary of the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved. Students must succinctly list the specific goals of the proposed research, e.g., create a novel design, solve a specific problem, address a critical barrier to progress in the field, or develop new technology. Whenever appropriate, students should clearly hypothesize a solution.

Technical approach: Description of the overall methodology and analyses to be used to accomplish the proposed objectives of the project.

References: Cite sources for background information and technical plan.

Oral Presentation

The student will prepare a brief PowerPoint presentation describing the problem to be solved and the proposed approach. The exam will begin with a 20-minute presentation by the student, which will be the starting point for the oral exam discussion. The presentation may lead to questions (based on the chosen subject areas and sometimes unrelated to the assigned topic and of a broader nature) related to the goals of the exam. The duration of the exam will be one hour.

Exam Outcomes

- By midnight of the 14th day after the proposal topic assignment, the student must submit a written proposal document through a Canvas website specifically dedicated to the QE. If a student fails to upload a document before the deadline, no oral exam will be administered and the student will be considered withdrawn from the exam and the sub-committee will be dissolved.

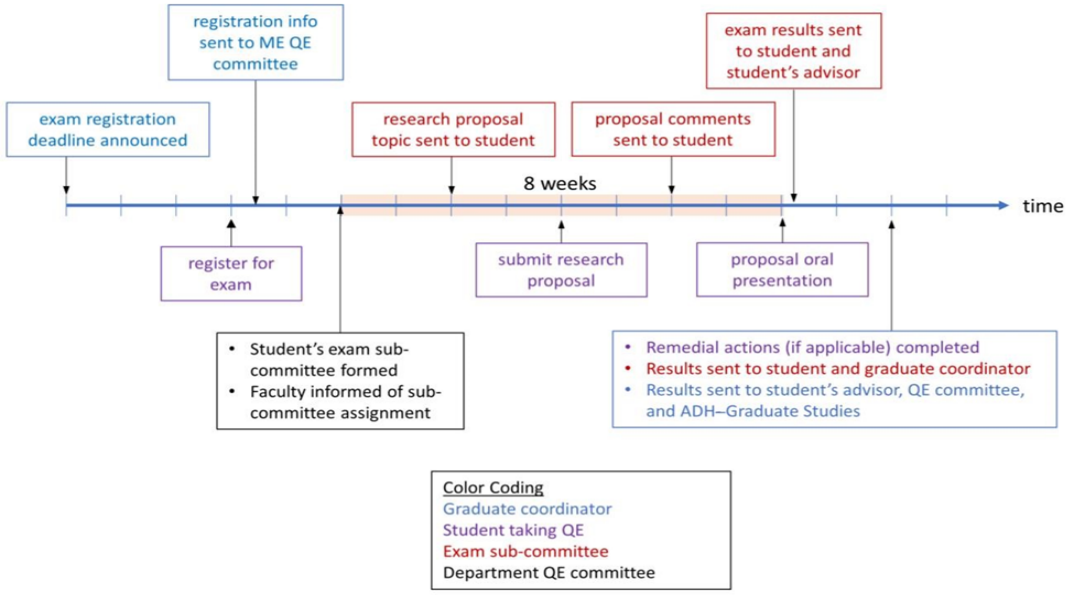
- If an incomplete proposal is submitted, the sub-committee will evaluate the document to determine if the student can proceed with the oral exam or ask to revise the document as a

first remedial action. • If the written proposal is acceptable to the sub-committee and the oral exam ensues, the student will be excused and the sub-committee will deliberate and reach a decision on the exam outcome immediately after the end of the oral exam. The sub-committee will convey the results to the ADH for Graduate Studies by email. Three exam outcomes are possible: ***Pass, Remedial Action, or Fail***. This should include a description of any deficiencies that need to be addressed before a passing grade is provided.

• All students will be notified in writing of the outcome of the exam by the ADH for Graduate Studies within one week following the completion of the exam. The notification may include deficiencies identified by the sub-committee that the student must be addressed prior to passing the exam. Passing the exam requires a unanimous decision from all three subcommittee members.

• Students who pass the QE are eligible to take the Preliminary Exam and become a Ph.D. candidate. Students for whom a deficiency is identified will be asked to remedy the deficiency within a given timeline as specified in writing by the sub-committee and communicated to the student by the ADH of Graduate Studies. If the remedy is satisfactory, the sub-committee will recommend to the ADH of Graduate Studies by email that the student passes. If the remedy is unsatisfactory, the student will be provided additional feedback and given a second opportunity to remedy the deficiency. A second fail will prevent the student from continuing in the Ph.D. program.

Timeline and Key Events for QE exam (research proposal route)



Proposal Evaluation

- In both the written and oral parts of the exam, the student must demonstrate proficiency in their area of expertise and a general understanding of the foundations of mechanical engineering.

- Students will be evaluated on their ability to formulate a rational approach to the requested research and their grasp of fundamental principles.
- The material presented must be sufficient for the Committee to make a realistic evaluation of the proposed research.
- Both the written proposal and the oral presentation will be evaluated in three areas, including Engineering, Analysis, and Impact (or Innovation).

Engineering

Engineering principles, formulations, and derivations must be explained in enough detail to demonstrate an understanding of the proposed research.

Analysis

The proposal must contain mathematical and/or experimental formulations, derivations, or quantitative statements of the physical problem to show the physical aspects of the proposed research. Examples of acceptable quantitative analyses include, but are not limited to, the development of a new mathematical or computational model, or the extension, modification, or validation (computational or experimental) of an existing mathematical/computational model or algorithm.

Impact (or Innovation)

The proposed research should be original and different from what has appeared in the literature from prior studies. The proposal must include a section that describes how the proposal meets this requirement. Impact (or Innovation) can be a new aspect or application of an existing research method or an entirely new way to address the subject. For example, an innovative proposal is one that does not repeat published studies, provides more than an incremental advancement in scientific discovery, or does not simply apply "off-the-shelf" methods to a related system.

ME Qualifying Exam Grading Rubric

This form can be used during the evaluation and scoring of the ME Qualifying Exam. These are recommendations and the Committee reserves the right to score differently. A score of 9

indicates an exceptionally strong application with essentially no weaknesses. A score of 1 indicates an application with serious and substantive weaknesses with very few strengths; 5 is considered an average score. The overall impact of the project can be grouped as high (7-9), medium (4-6) and low (1-3).

Evaluating Written Proposal & Oral Presentation

Committee evaluations of the *written proposal* and *oral presentation* should consider the following criteria. Each evaluation should be a combined assessment of both the written report and the oral presentation.

1) Problem Description and Significance: Students should provide a description of the problem to be solved, specific aims to be addressed, technical background, and the significance of the problem.
    - Is there thoughtful literature review and knowledge of the problem?
    - Is there a strong scientific rationale presented to support the aims?
    - Is a hypothesis for the research clearly stated?

2) Impact and Innovation: Does the student effectively explain how this proposal seeks to advance the field? What new knowledge is being gained? How will the proposed work impact the current research field?

3) Approach:

3a) Specific Aims: This section should concisely state the goals and objectives of the proposed research.
- Is the proposal guided by a strong motivation?
- If applicable, is a quantitative model proposed to support the aims and is it appropriate? Alternatively, is the data collection procedure sound and well planned?
- What is the broader impact of the proposed work?

3b) Description of the Mathematical Model

This section should include a description of the mathematical problem to be solved, and the mathematical model itself. This section should include all governing equations and all derivations necessary to support the model. Reviewers should evaluate the student's understanding of the governing equations, model assumptions, and limitations of the mathematical model.

4) Quality of Writing
- Did the student follow page limits and formatting guidelines?
- Are there major grammatical errors in the written proposal?

- Is the flow of information easy to follow?
- Was the report run though a similarity check algorithm to check for plagiarism?

5) Quality of Question & Answer Session
   - Did the student provide thoughtful answers to questions?
   - Did the student demonstrate a strong understanding of fundamental concepts?
   - Were there any major weaknesses identified during the Q/A session?

Evaluating the Oral Presentation

Committee evaluation of the oral part of the exam should consider quality of (a) PowerPoint slides, (b) oral presentation, and (c) Q/A session.

Recommendations for Scoring

Pass: All sections are scored on a scale of 1-9, with at least 2 sections receiving ***High (7-9)*** scores (Approach section score must be "High").

Remedial Action: Students have mostly ***Medium (4-6)*** scores that can be addressed per each committee's recommendation. The sub-committee will provide actions needed to address the deficiencies. If the deficiencies are adequately addressed, then the sub-committee can recommend a motion to "Pass."

Remedial Action (resubmission): Students receiving ***Low (1-3)*** scores in 2 or more sections may be considered for a "Fail" grade, especially if the Approach section receives a "Low" score. In this case, the committee must have recognized fatal flaws in the approach and methodology. If this applies to the original or first resubmission, then a resubmission should be encouraged. If it applies to the second resubmission, then the exam should be considered as failed.

APPENDIX E: THESIS AND DISSERTATION PREPARATION

The intention of these notes is to aid in thesis and dissertation preparation, not to replace other instructions. Carefully read the Graduate Catalog produced by the Graduate School; it is the final word. These notes help in timing and writing, as well as clarifying the role of the faculty research mentor and committee. Note also, all M.S. theses and doctoral dissertations are submitted electronically (ETD). Separate ETD instructions are available on the Graduate School's web site.

Completion of Research

Some parts of the thesis and dissertation, such as the introduction and literature review, are written before the research is complete. The faculty research mentor and student reach an agreement early in the research, on work expectations. They then agree when the research is complete and the student is ready to write. ***The thesis/dissertation is written and reviewed by all committee members before the final defense is scheduled.*** Students contact their Examination Committee early in the process to find available day(s) and time(s) for the defense. *Requests to hold a final exam in less than two weeks are denied by the department and Graduate School.*

Timing

Poor theses and dissertations result from improper timing, more than from any other single cause. All too often, students start intensive work on their theses and dissertations when it is too late to do a good job. The result, at best, is a poor thesis or dissertation and a delay in graduation. The Writing Center is an excellent resource for students as well as the departmental Director of Technical Communication Program.

The major events in preparation and submission of the thesis or dissertation (see Graduate Catalog) are:

1. Outline to faculty research mentor/committee chair -- this is the point where one begins writing, well ahead of the date s/he expects to graduate.
2. First draft to Chair – anticipate a considerable amount of alteration. All experimentation/research is complete.
3. Final draft to Chair – a complete draft includes title page, figures, etc. Misspelled words, typographical errors, poor construction, unnumbered pages, etc., make a draft unacceptable. Allow one week for the chair to review and one week for corrections before submission to the Advisory Committee.
4. Thesis/dissertation to committee – A complete document printed in final format at least 3 weeks before the exam. *Please note the final document is reviewed by the Advisory Committee* ***before*** *agreeing on a final defense date.*
5. Verify the ETD is appropriately written and cited, using the iThenticate system.

6. Final Exam – Scheduled during the academic and summer terms. The Request to Admit Candidate to Final Exam is submitted to the Graduate School office *at least two weeks before the exam*. Anticipate two weeks' time between the exam and submission of the final ETD for alterations.
7. Submission of final ETD to Graduate School Office -- no later than two weeks after the final oral examination.

Responsibility

The thesis or dissertation is the student's original work and her/his responsibility. The student must plan and write the document, with some organizational help from the faculty research mentor. Students must take care with the word processing, proofreading, and checking of the analysis. If the candidate cannot handle this responsibility, s/he does not deserve a graduate degree. *It is not the responsibility of the faculty research mentor and the Advisory Committee to help write and proofread the thesis or dissertation.*

The major professor's role is one of mentoring. S/he reviews the outline and successive drafts with the student and gives advice; not write, proofread or, check analyses. The faculty research mentor expects neat, readable copies from the student, with plenty of room for comments.

The other Advisory Committee members review the final copy only after it is approved by the faculty research mentor. They will read it for general technical content and level of endeavor, and approve, approve with revision or, disapprove of it before scheduling the final defense. They serve in an advisory capacity throughout the research, especially for a Ph.D. candidate.

Thesis and Dissertation Format and Style

A limited number of specific rules on format are covered in the Graduate Catalog. Other rules are dictated by grammar and presentations of technical materials. There are many good books on style – *'The Elements of Style'* by Strunk & White and *'Plain Words'* by Sir Ernest Gowers are strongly recommended. Technical journals give some ideas of accepted practice but, these are papers, not theses/dissertations. Previous ETDs (Electronic Thesis or Dissertation) are available to browse in the Digital Library & Archives. Discuss the format with the faculty mentor when completing the outline.

A technical thesis or, dissertation will normally include the following:

1. Title page (see ETD Title page and abstract Word template).
2. Abstract - briefly describes the problem, the research program, and the main results.
3. Acknowledgments - recognizes help in the research and document preparation.
4. Table of Contents - lists section headings and page numbers.

5. *List of Figures - lists all figures with page numbers. **Pay special attention to reproduced imagines, figures, etc. to meet copyright requirements. This often delays approval of ETD's, resulting in delayed graduation dates.*
6. Nomenclature - defines all symbols unless they are defined where they are used. Use standard symbols where possible. Give units of physical quantities.
7. Text.
   a. Introduction - defines and gives the history of the problem, state the motivation and purpose of the research, and give a review of the literature. (If the literature review is long, use a separate section.)
   b. Body - includes separate sections for experiment (equipment and procedures), analysis, discussion of results, etc.
   c. Conclusions and Recommendations - summarizes the main conclusions and makes recommendations.
8. References
9. Appendix (if used).
10. Vita

Submission of Electronic Thesis/Dissertation/Report

Note: Electronic submission of theses/dissertations (ETDs) is required. Electronic submission of the report for MEng is optional but encouraged.

The final document is submitted within two weeks following the final exam to avoid SSDE registration the next term.

APPENDIX F: ME TECHNICAL ELECTIVES LIST

URL: https://www.registrar.vt.edu/content/dam/registrar_vt_edu/documents/Updates/coe/23-24/coe_me_23_24.pdf