POLICIES AND PROCEDURES FOR GRADUATE STUDENTS IN MECHANICAL ENGINEERING

Please be aware, this document is subject to revision. Changes will be communicated via e-mail to current graduate students

This document is meant to provide all of the basic information needed by graduate students in Mechanical Engineering. It consists of the rules and procedures of the Mechanical Engineering Department, along with those of the Graduate School as found in the Graduate Catalog. If the answer to a question cannot be obtained from the Graduate Catalog or these notes, the answer should be sought by asking: the Graduate Coordinator, your major professor, the Mechanical Engineering Graduate Program Chair, or the Graduate School, preferably in that order. Our intention is to provide you with information that will be helpful in your graduate studies. Note: The Graduate School has authority to change policies and procedures at any time.

Additional information on graduate study can be found on the websites of the University, the Graduate School, and the ME Department.

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SPECIAL ADMISSION IN MECHANICAL ENGINEERING

\textit{Accelerated Undergraduate/Graduate Degree - 30 hours required}

The goal of the Accelerated Undergraduate/Graduate Degree (UG/G) program in Mechanical Engineering is to allow students with an appropriate background to start contributing to their graduate degree before the completion of their Bachelor of Science degree in the VT \textit{College of Engineering}. The UG/G program allows for the counting of some classes towards both a Bachelor’s degree and a graduate degree(s), and also facilitates students finding advisors and research projects as early as possible. The UG/G program in the Department of Mechanical Engineering, currently allows a student in the Virginia Tech College of Engineering Bachelor of Science (BS) majors to count up to 12 hours of course work (under certain restrictions) towards both their VT COE BS degree and graduate degree(s) in Mechanical Engineering.

Virginia Tech undergraduate students within the College of Engineering, \textbf{who have completed 90 hours with an overall GPA of 3.5 or higher}, qualify for this program. Applications for the UG/G program must be submitted prior to the semester of admission into the UG/G program. Students must have at least one semester remaining in their BS degree program. UG/G students may apply a year or a semester prior to graduating with their BS degree. The application windows for a Fall start are April 1\textsuperscript{st} through May 1\textsuperscript{st} and for a Spring start are September 1\textsuperscript{st} through October 1\textsuperscript{st}.

\textit{Mechanical Engineering UG/G Program Requirements}

The UG/G program in Mechanical Engineering is designed to both accelerate a student’s time to completion of their graduate degree(s), and also to facilitate a student’s transition to the graduate program. In addition to counting some courses towards multiple degrees, the program is designed to pair students with initial graduate faculty advisors to mentor them through both course selection and research opportunities within the VT Department of Mechanical Engineering. \textit{Initial graduate faculty advisors may, or may not be the final graduate advisor for a student} and serve to facilitate a student’s transition to graduate school.

A faculty member must agree to serve as an initial graduate faculty advisor for students in the UG/G program. Students and faculty may self-select, and students should directly contact faculty they have identified with similar interests, to confirm their willingness to advise.
The UG/G student, in conjunction with both their initial graduate faculty advisor and their undergraduate faculty advisor, selects up to 12 hours of courses to count in the last 12 months of their undergraduate program towards the completion of their BS and graduate degrees. Up to 6 of the 12 credit hours on the UG/G Plan of Study can be at the 4000-level. Any 4000-level class included must be a technical elective and not a “required” course (for example, the required senior lab, ME4006, would not qualify to be counted towards multiple degrees). If a class is offered as a conjoint class at both the 4000 and 5000-level, UG/G students must take the 5000-level course. All graduate degree courses must be taken A-F and students must receive a “B” or higher for the class to count towards both the BS and graduate degrees. Once a student is accepted into the program, the student must maintain an overall GPA of 3.0 or above, in order to continue to qualify for the UG/G program. Only coursework, not research hours, can be counted towards the undergraduate and graduate degree(s) and must be at least a “B”. UG/G students must follow the restrictions on the number of special and independent study courses listed in the Graduate Catalog.

The student is not eligible for an assistantship until the B.S. degree is completed. Upon completing the B.S. degree, the student must submit a FINAL Accelerated Undergraduate/Graduate Degree and Course Designation form before the transcript will be marked by the Registrar’s Office. Students should re-submit this form regardless of their intention to complete the graduate degree, or not.

**VT Mechanical Engineering UG/G Application and Admission Process**

The GRE’s are waived for UG/G students. The application process requires two steps:

**Step 1:** Online Application. Students must specifically apply for the graduate degree program in Mechanical Engineering. There is no specific “UG/G” option, so students must choose either the MS, or PhD degree. Application materials must include:

- VT Transcripts – unofficial Hokie SPA transcripts are acceptable & MUST be uploaded
- Three letters of reference (preferably one or more from VT ME or COE faculty)
- Resume
- Statement of Purpose/Personal Statement
  - Why do you want to go to graduate school?
  - What are your career objectives?
  - What is your general research area of interest?
  - Have you identified an initial faculty advisor? (Your answer to this part of the question will not impact your application)

**Step 2:** After completing the online application, students must do the following:

- If an initial graduate faculty advisor has not been identified, please place a request for assignment of an advisor with the Graduate Coordinator, Mrs. Cathy Hill (hillcath@vt.edu), and the Graduate Chair, Dr. Corina Sandu (csandu@vt.edu) by email. Please indicate your research interest areas.
- Submit the following form:
  - UG/G Mechanical Engineering Student Program Evaluation form – to be given to ME Graduate Coordinator
Accelerated Undergraduate/Graduate Degree and Course Designation – to be given to ME Graduate Coordinator

- These forms will require a face-to-face meeting with a student’s initial graduate faculty advisor. Sections of this form need to be filled out by the student prior to meeting with the advisor in preparation for the meeting (see instructions on form).
- The student should complete the proposed list of classes on the Accelerated Undergraduate/Graduate Degree and Course Designation form during the face-to-face meeting with the initial graduate faculty advisor, and obtain approval signature at that time.

Turn in the UG/G Mechanical Engineering Student Program Evaluation form and the Accelerated Undergraduate/Graduate Degree and Course Designation form to Mrs. Annette Ben-Tzvi (abentzvi@vt.edu) or Mrs. Cathy Hill (hillcath@vt.edu) in Randolph 104/105 to complete the application process.

Upon approval of the student's application by the ME Graduate Committee, the department forwards the Accelerated Undergraduate/Graduate Degree and Course Designation form on to the Graduate School for final approval. Final admission of the student to the program is done by the VT Graduate School. However, the student is still considered an undergraduate for tuition purposes until the Bachelor's degree is conferred and the student is admitted as a Regular Graduate student.

DUAL APPLICATION FOR MS

Virginia Tech seniors who intend to receive a bachelor's degree, are within the last semester of graduation, and have a GPA of 3.0 or better, may take graduate level course work to satisfy an advanced degree program as dual registrants. Such work may only be used to satisfy graduate degree requirements with the consent of the ME Graduate Program. Students follow the same application procedures and should submit an Accelerated Undergraduate/Graduate Degree and Course Designation form with the application materials. Students must apply and be admitted PRIOR to taking the graduate level course(s).

PHD INTERNAL APPLICATION PROCEDURES

Students in the M.S. program may apply for the Ph.D. program after completing two semesters of graduate study. Internal applicants (i.e., those students who have recently completed, or are in the process of completing the Master's program in the Mechanical Engineering Department at Virginia Tech, including Nuclear Engineering degrees) should contact the Graduate School for an application fee waiver for the Online Application. The readmission application should include the following:

1. Unofficial Hokie SPA transcript
2. Three references: one from MS advisor, one from the proposed PhD advisor. (If it’s the same advisor, then someone familiar with the research should provide the remaining letters.)
3. PhD statement of purpose from the student
4. PhD qualifier status (MS students may take the PhD Qualifier Exam at any time.)
The Mechanical Engineering Graduate Admissions Committee will evaluate the application for re-admission. If admission is recommended the Change of Degree Status form must be returned to Mrs. Annette Ben-Tzvi (abentzvi@vt.edu) or Mrs. Cathy Hill (hillcath@vt.edu) in Randolph 104/105 to complete the application process. Students receive official approval and notification by the Graduate School of the department's decision.

GRADUATE HONOR CODE

The Graduate Honor Code establishes academic integrity among graduate students. All incoming graduate students are notified of the honor code upon application to Virginia Tech. By accepting admission, you 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 that are referred to the GHS, and to impose a penalty when a student is found guilty.

You can 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 is found online in the Graduate Honor Code web site.

REGISTRATION

Particular attention should be paid to the requirements for registration. Any student pursuing any phase of his or her graduate program must be continually registered. Students are expected to make continuous progress toward their degrees and, therefore, to be enrolled for graduate credits each semester during the academic year, until completing requirements. No minimum registration is required during the summer, regardless of the students' financial support. However, 3 credit hours each summer term are considered full-time. 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 advisor must approve and the Fiscal Technician must be notified upon registration if tuition is paid by the ME Department. During the academic year, active students can register online through Hokie SPA.

Full-time enrollment for graduate students, for the purposes of tuition and fees, consists of a minimum of 9 credit hours during academic year semesters. However, the Commonwealth of Virginia does not count students as full time unless they are enrolled for at least 12 credits, and in most academic contexts, 12 credits is considered full time. However, students funded by the ME Department (GTA, GRA, GA, or other similar funding) are expected to enroll in 18 hours of courses and/or research during the academic year until required courses are complete. This is to prevent students from dropping below the minimum 12 required if they withdraw from too many courses. Students are often conducting research in the summer, but not registered for research credit, so enrolling in “extra” research hours in the fall and spring “make-up” for the difference. (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.) Once coursework is complete, graduate students with assistantships should only register in 12 total hours of research and seminar. The
minimum registration for unsupported students is 3 credit hours unless they will be under Start of Semester Defense Exception (SSDE). Students CANNOT register themselves under SSDE.

Students registering for thesis or dissertation hours must communicate with their major professor before registering, to determine the appropriate number of ME 5994/NSEG 5994 or ME 7994/NSEG 7994 credits to take. The number of credits should be proportional to the level of activities being devoted to the work undertaken. For example, a PhD student working full-time on dissertation activities and taking no other course work, should register for seminar and 11 hours of ME 7994/NSEG 7994, for the fall and spring semesters. When starting the degree, all MS students should complete 9 hours of ME 5994/NSEG 5994 before taking any ME 7994/NSEG 7994. Direct PhD and PhD students will register only for ME 7994/NSEG 7994 research courses.

If registration is for the purpose of thesis/dissertation defense ONLY, unsupported students may request Start of Semester Defense Exception for only 1 credit hour, if the defense is scheduled within the first five weeks of the term academic term. The Graduate School will enroll the student for the 1 hour upon completing the SSDE form at least 3 weeks prior to the defense. The Request to Admit Candidate to Final Exam must be submitted at least 2 weeks prior to the defense. No defense may be scheduled in between semesters. Students registered for SSDE student status are ineligible to receive assistantships during the respective academic semester.

Individuals not enrolled cease to be students and do not have access to university facilities. In those extraordinary cases where enrollment is not continued, the student must request a Leave of Absence from the Graduate School. Upon returning, the student will be required to apply to the Graduate School for re-admission. The Leave of Absence Request form is available online and at the Graduate Life Center (GLC). Students not enrolling during two consecutive academic year semesters and not requesting a Leave of Absence will be dropped and must re-apply for admission as a new student. Applications will be evaluated by the departmental Graduate Admissions Committee in the same manner and with the same admission guidelines in use at that time, as for new applicants. Consequently, readmission applications must be submitted several weeks before the start of a semester to allow for this evaluation and to avoid late registration.

SPECIAL AND INDEPENDENT STUDY COURSES

Special and Independent Studies at the graduate level require a syllabus and method of evaluation. Credits may be used in meeting degree requirements. Special Study courses are not to be offered on a recurring basis, but they may be courses which are being tested before being proposed as regular courses. The Request for Special Study form is available on the Graduate School's web site. Refer to the Graduate Catalog for the maximum hours of Special Study and/or Independent Study that may be used to meet degree requirements. A course description must be provided for approval towards the degree. See ME Graduate Coordinator for approval procedures before taking any Special, or Independent Study courses.

Syllabi for special studies (ME5984/ME6984/NSEG5984/NSEG6984) courses should be submitted to the ME Graduate Office at least one semester prior to the term the course is offered. All ME special study syllabi must be approved by the ME Graduate Chair and the College of Engineering before submission to the Graduate School. The course syllabi should contain a distinctive title, not simply "Special Study." They may be taken A-F and it is expected that multiple students will enroll.
Syllabi for independent studies (ME5974/NSEG5974) courses should be submitted to the ME Graduate Chair at least 30 days prior to the semester the course is offered. All ME 5974/NSEG5974 syllabi must be approved by the ME Graduate Chair and the College of Engineering. The course syllabi should contain a distinctive title, not simply "Independent Study." Independent Studies are only offered P or F and it is expected that only one student will enroll.

SELECTING AN ADVISOR AND COMMITTEE

The Mechanical Engineering Graduate Program Chair will serve as a temporary advisor, at the beginning of the first semester of study, for those students who have not made prior arrangements. The Office of the Graduate School Ombudsperson provides Self-Help Resources on selecting an advisor under Professional Relationships.

Advisors are not assigned to students; rather, they are determined by mutual agreement between individual students and professors. When a student works as a GRA, the faculty providing the research funding normally serves as the advisor. A student's advisor provides guidance in defining a Plan of Study and in monitoring the student’s progress. 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 student's advisor. Students are expected to take the initiative in selecting their advisor.

The student and his or her advisor jointly select the other members of the Advisory Committee. The student is responsible for obtaining from those chosen, their agreement to serve. The advisor must be a core faculty member in Mechanical Engineering, or a VT COE faculty member that has Affiliate Faculty status in Mechanical Engineering. A non-ME Faculty and non-ME Affiliate faculty may co-chair an ME student with an ME Faculty. A Graduate Program Faculty & Additional Committee Member Registration form is required for these individuals, and the Associate Department Head for Graduate Studies must approve the member on a case by case basis. For Nuclear Engineering degrees, the advisor or a co-advisor must be a faculty member in the Nuclear Engineering Program.

The Advisory Committee for a Masters candidate must consist of a minimum of three faculty members (i.e., advisor and two committee members), at least two of whom must be core faculty in the Virginia Tech Mechanical Engineering Department (tenured, tenure-track, or professors of practice). This committee may have one member outside VT ME Department, but it is not mandatory. The committee composition must have at least 2/3 of its members VT faculty.

The Advisory Committee for a PhD candidate normally consists of a minimum of four faculty members (i.e., advisor and three faculty members), at least three of whom must be core faculty in the Virginia Tech Mechanical Engineering Department (tenured, tenure-track, or professors of practice) and one must be outside the VT ME Department. The committee composition must have at least 2/3 of its members VT faculty.

Any non-VT committee member must be approved by the Associate Department Head for Graduate Studies to be 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 members cannot outnumber the ME faculty on the Advisory Committee.*

The student and his/her advisor are responsible for arranging meetings of the Advisory Committee at appropriate times. It is strongly recommended that the Advisory Committee meets when the student is starting the research to discuss the undertaking. As a minimum, each student should arrange a meeting with the Advisory Committee *at least once per semester.* The Advisory Committee should meet at least one other time when the student and the advisor feel that a significant portion of the research has been completed. Each student should meet with his or her advisor *regularly* to discuss the status of the graduate program and research. If a student enrolls in ME/NSEG 5994 or 7994, and fails to meet with the advisor in the semester, s/he will receive no credit for those research hours.

Please note, an Advisory Committee can be changed as the degree program proceeds. Copies of *forms* are available on the Graduate School’s web site. Advisory Committee changes after the Plan of Study approval requires *all* committee members (old and new), and the procedure followed is the same as for the original plan of study, with the exception of using the Graduate School’s *Change of Committee-Advisor* form.

**PLAN OF STUDY**

Departmental policy requires students to submit a *Plan of Study (POS)* during their first, or second semester depending on the degree sought. Specifically, for a Masters student entering in the Fall semester, the POS must be submitted by December 1st. A PhD student entering the Fall semester must submit their POS by May 1st. (Corresponding dates pertain to students entering in the spring term.) *Note that this submission date is one semester earlier than that required by the Graduate School.* This early submission helps the students proceed with their degree in a timely manner and facilitates planning of course offerings within the department. *Students failing to do this may find that their registration has been blocked.* The POS must meet departmental and Graduate School requirements in effect for the designated degree at the time the plan is submitted. *A POS is only official when all of the courses are listed and the form is signed by the entire Advisory Committee.* The departmental degree requirements, facilities and course offerings are listed in the [Graduate Catalog](#).

The POS represents a contract between the student and the University. The Graduate School will use the POS in determining whether, or not the student has met the graduation requirements when the [Application For Degree or Certificate](#) is made. Please note, study plans can be changed as degree programs proceed. Copies of *forms* are available on the Graduate School’s web site. Approval of changes to the POS, are required by *all* committee members, and the procedure followed is the same as for the original study plan, with the exception of using the Graduate School’s [Plan of Study Change](#) form. With the possible exception of research hour changes, it is important that study plans be kept current. Requests for changes in the POS must be processed *before* the requested change actually takes place. *Retroactive change requests are not acceptable.* *Requested changes in plans of study must be submitted by the course-add deadline during the semester for which the change is requested.*

A POS is determined between the student and his or her advisor and approved by the Advisory Committee. Blank departmental forms for working out the Plan of Study are available on the ME web site. The student should make a personal copy. The student should then give
the signed POS to the Graduate Coordinators in 104/105 Randolph Hall. It will be logged in for approval. Approved study plans are then entered electronically on the BANNER system. Ultimately, the plan will be acknowledged by the Graduate School and approved on Hokie Spa. The student should allow four weeks to see if the plan has been approved by checking on Hokie Spa.

It is highly recommended that students take 5000 level courses instead of 4000. Any 4000-level class included must be a technical elective and not a “required” course (for example, the required senior lab, ME4006, would not qualify). No 4000-level courses are permitted for a nuclear engineering graduate degree plan of study. If a class is offered as a conjoint class (offered at both the 4000 and 5000-level), students must take the 5000-level course. All graduate degree courses must be taken A-F (unless only offered P/F). Failure to submit the official plan of study in a timely fashion will result in a “HOLD” being placed on the students’ accounts, blocking registration. Again, a POS is only official when all of the courses are listed and signed by the entire Advisory Committee.

TRANSFER COURSES

Transfer courses are not automatically “pre-approved.” They are approved on the POS by the Advisory Committee. A maximum of 50% of graded course work may be transferred from another university in which the student was a graduate student. All courses must be graduate level (5000 or above) have a “B” or better and cannot have been used to complete the B.S. degree. See the Graduate Catalog for more details and procedures to transfer courses.

OLD COURSES

Occasionally, students may want to have graduate courses older than 5 years considered on their Plan of Study. These courses are not automatically pre-approved, and Graduate School required documentation in order to approve them. The documentation consists, in addition to the transcript, of course description and course syllabus.

MECHANICAL ENGINEERING MASTER OF SCIENCE PROGRAM

1. You must have a minimum 30 hours plan and it must include the following minimum requirements:
2. 6 hours of ME 5994 Research and Thesis. (If you complete 9 hours of ME 5994 continue to take ME 7994. ME 7994 hours should not be listed on the MS POS)
3. 20 total hours of approved coursework; of those 20 you must meet the following:
   15 hours at the 5000 level, or higher
   9 hours of ME Course Work
   3 hours ME approved mathematics or statistics courses
4. A maximum of 6 hours of 4000 level courses
5. **Maximum** of 6 hours for **Special Study** and/or **Independent Study**. A course description must be provided for approval towards the degree.

6. No courses below the 4000 level will be accepted for graduate credit.

An expected date for completing the **Final Exam** (semester/year) must appear on page 2 of the Plan of Study. ALL committee signatures are required on the last page for the POS to be official and ready for submission for final approval. See sample POS below:

### MECHANICAL ENGINEERING MASTER OF ENGINEERING PROGRAM

The Master of Engineering Degree (MENG) is primarily intended for people working in industry/government and pursuing a graduate degree on a part-time basis. Because it requires more coursework and less research, departmental funding is not available. The MENG degree does not lead to the PhD degree program. MENG candidates submit a final Project Report to the Advisory Committee. The 30 hours degree requirements are:

1. A **minimum** of 6 hours of ME 5904; Project and Report.
2. A **minimum** of 24 hours of courses.
3. A **minimum** of 3 hours of ME approved mathematics or statistic courses.
4. A **minimum** of 18 hours of courses numbered 5000 or higher.
5. A **minimum** of 6 hours of courses outside the student’s discipline area.
6. A maximum of 6 hours of approved courses numbered at the 4000 level.

An expected date for completing the Final Exam (semester/year) must appear on page 2 of the Plan of Study. ALL committee signatures are required on the last page for the POS to be official and ready for submission for final approval. See sample POS below:

MENG students must follow the same examination procedures as MS students, with the exception of degree requirements and submitting a Project Report, instead of a thesis. The Project Report is not published; therefore, expectations of the written product should be established by the advisor and committee at the beginning of the student’s graduate program. The Request to Admit Candidate to Final Exam should be submitted AT LEAST 2 weeks prior to the defense of the Project Report.

MECHANICAL ENGINEERING DOCTORAL PROGRAM

Two semesters of full-time enrollment must be completed while in residence at the Virginia Tech Blacksburg or another qualified PhD campus. There are exceptions that will require prior approval from the Graduate School (i.e., designated programs at the Northern Virginia Graduate Center.) Doctoral students must complete a minimum of 90 semester hours of graduate study beyond the baccalaureate, including a dissertation. PhD students must submit a Plan of Study (POS) before completing the second semester registered as a PhD
Most of the course work for the MS degree can be counted toward the PhD course work. The POS must meet the following requirements:

<table>
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<th>Requirements</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td><strong>Research and Dissertation (7994)</strong></td>
<td>Minimum: 30</td>
</tr>
<tr>
<td><strong>Courses numbered 5000 or higher</strong></td>
<td>Maximum: 24</td>
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<tr>
<td><strong>Courses numbered 4000</strong></td>
<td></td>
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<tr>
<td><strong>ME approved Math/Statistics</strong></td>
<td>Minimum: 3</td>
</tr>
<tr>
<td><strong>Independent/Special Study Courses (5974 and 5/6984)</strong></td>
<td>Maximum: 12</td>
</tr>
<tr>
<td>**Graduate Courses (<strong>4000-level or higher)</strong></td>
<td>Minimum: 30</td>
</tr>
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</table>

**It is highly recommended students take 5000 level courses instead.** Course credit hours can be changed to fit an individual's program, but keep in mind students must have a minimum of 30 hours of course work (to include 3 credit hours of math).

See sample POS below:
For PhD students, an expected date for completing the Preliminary Examination (semester/year) must appear on page 2 of the Plan of Study, as well as the estimated date for the PhD Qualifier & the Final Exam.

NUCLEAR ENGINEERING MASTER OF SCIENCE PROGRAM

Earning an MS degree requires completing a 30-credit-hour program subject to the following requirements. Except as indicated, courses must be taken for a grade, not Pass/Fail. MS students must submit a Plan of Study before completing the first semester registered as a MS student. No grade below B- is allowed for any core course.

1. Master of Science Courses: A minimum of 21 graded credit-hours of courses must be taken including the following:

a. Core Courses (15 graded credit-hours) which include four required courses and one mathematics/statistics course:

12 credit-hours of required courses:
(1) NSEG 5124 Nuclear Reactor Analysis
(2) NSEG 5204 Nuclear Fuel Cycle
(3) NSEG 5604 Radiation Detection and Shielding
(4) either NSEG 5424 Reactor Thermal Hydraulics or MSE 5384G Advanced Nuclear Materials

A minimum of 3 graded credit-hours of a mathematics or statistics course from an approved list of courses.

b. Elective Courses: Six credit-hours of any science, engineering or mathematics 5000-level, or higher, courses as approved by the Advisory Committee are required. However, if only six credit-hours of NSEG 5994 are applied toward the degree instead of nine credit-hours (see Research Requirements below), the student must take an additional 3 credits of any science, engineering or mathematics 5000-level, or higher course, as approved by their Advisor, to satisfy the requirement for a total of 30 credit-hours for the MS degree.

The graded course work may include 5984/6984 Special Study. However, a student cannot exceed a maximum of 6 credit hours of 5974, 5984, and 6984.

2. Master of Science Research Requirement: A minimum of 6 credit-hours of NSEG 5994 Research and Thesis, not to exceed 9 credit-hours, must be completed.

Additional Requirements: All students must satisfactorily pass an oral final examination, write and successfully defend a thesis.
No courses below the 5000 level will be accepted for graduate credit toward the Master of Science in Nuclear Engineering.

**NUCLEAR ENGINEERING MASTER OF ENGINEERING PROGRAM**

Earning an MEng degree requires completing a 30-credit-hour program subject to the following requirements. Except as indicated, courses must be taken for a grade, not Pass/Fail. MEng students must submit a Plan of Study before completing the first semester registered as a MEng student. No grade below B- is allowed for any core course.

1. **Master of Engineering Courses:** A minimum of 24 graded credit-hours of courses must be taken including the following:

   a. **Core Courses** (15 graded credit-hours) which include four required courses and one mathematics/statistics course:

   12 credit-hours of required courses:
   (1) NSEG 5124 Nuclear Reactor Analysis
   (2) NSEG 5204 Nuclear Fuel Cycle
   (3) NSEG 5604 Radiation Detection and Shielding
   (4) either NSEG 5424 Reactor Thermal Hydraulics or MSE 5384G Advanced Nuclear Materials

   A minimum of 3 graded credit-hours of a mathematics or statistics course from an approved list of courses.

   b. **Additional NSEG Course:** An additional 3 credit-hours of a graded NSEG 5000-level, or higher, course is required.

   c. **Elective Courses:** Three credit-hours of any science, engineering or mathematics 5000-level, or higher, course as approved by the Advisory Committee are required. However, if only three credit-hours of NSEG 5904 are applied toward the degree instead of six credit-hours (see Project Requirements below), the student must take an additional 3 credits of any science, engineering or mathematics 5000-level, or higher course, as approved by their Advisor, to satisfy the requirement for a total of 30 credit-hours for the MEng degree.

   The graded course work may include 5984/6984 Special Study. However, a student cannot exceed a maximum of 6 credit hours of 5974, 5984, and 6984.

2. **Master of Engineering Project Requirement:** A minimum of 3 credit-hours of NSEG 5904 Project and Report, not to exceed 6 credit-hours, must be completed.

**Additional Requirements:** All students must satisfactorily pass an oral final examination, write and successfully defend a Project & Report.
No courses below the 5000 level will be accepted for graduate credit toward the Master of Engineering in Nuclear Engineering.

**NUCLEAR ENGINEERING DOCTORAL PROGRAM**

The 90 credit-hours are made up of (1) 30 graded credit-hours of coursework consisting of six core courses and four additional courses in the categories of NSEG 6000-level courses, Breadth or Elective courses, (2) 30 credit-hours of research, and (3) 30 credit-hours of enhancement courses which may consist of either research credits or graduate-level courses taken from any unit of the University.

1. **Doctor of Philosophy Courses:** A minimum of 30 graded credit-hours of courses must be taken including the following:

   a. **Core Courses** (18 graded credit-hours) which include four required courses and two mathematics/statistics courses:

      12 credit-hours of required courses:
      (1) NSEG 5124 Nuclear Reactor Analysis
      (2) NSEG 5204 Nuclear Fuel Cycle
      (3) NSEG 5604 Radiation Detection and Shielding
      (4) either NSEG 5424 Reactor Thermal Hydraulics or MSE 5384G Advanced Nuclear Materials

      A minimum of 6 graded credit-hours of a mathematics or statistics courses from an approved list of courses.

   b. **6000-level NSEG Courses:** Any two NSEG 6000-level courses as approved by the Advisory Committee.

   c. **Breadth Requirement:** An additional 3 credit-hour NSEG 5000-level, or higher, graded course. This course should provide some breadth by being in an area outside the student's specialization as determined by the student's Advisory Committee.

   d. **Elective Course:** Three credit-hours of any science, engineering or mathematics 5000-level, or higher, course as approved by the Advisory Committee is required.

   The graded course work may include 5984/6984 Special Study. However, a student cannot exceed a maximum of 12 credit hours of 5974, 5984, and 6984.

2. **Doctor of Philosophy Research Requirement:** A minimum of 30 credit hours of NSEG 7994 Research & Dissertation must be completed successfully.
3. **Doctor of Philosophy Enhancement Requirement:** A minimum of 30 additional credit-hours consisting of a combination of either graduate coursework (5000-level or higher) from any unit of the University and/or research and dissertation credits (NSEG 7994), as approved by the student’s Advisory Committee. These credits are tailored for the specific research topic and background of the student. Additional in-depth courses related to the student’s research area, if applicable, would be included under this requirement. Moreover, students who plan to enter academia after completion of their PhD are encouraged to take electives such as GRAD 5104 Preparing the Future Professoriate and ENGE 5014 Foundations of Engineering Education. Those planning to enter industry are encouraged to take electives such as GRAD 5314 Future Industrial Professional in Science and Engineering. Obtaining a Graduate Certificate in the Future Professoriate or other areas are also encouraged. These electives will also satisfy part of the 30 credit-hours enhancement requirement.

**Additional Requirements:** All students must satisfactorily pass the qualifying, preliminary and oral final examinations, write and successfully defend a dissertation, and complete a residency experience through full-time enrollment on the Virginia Tech Blacksburg or NOVA campus for two consecutive semesters.

No courses below the 5000 level will be accepted for graduate credit toward the Doctor of Philosophy in Nuclear Engineering.

**EXAMINATION PROCEDURES**

**PHD QUALIFYING EXAM**

The purpose of the qualifying exam is to ensure that the students have a broad mastery of undergraduate material sufficient to serve as a basis for doctoral-level research and scholarship in mechanical engineering. All students have two chances to pass the qualifying exam during their studies in the Graduate Program in the ME Department.

1. **PhD Qualifying Examination for students entering the program with a B.S.**

   Students entering the graduate program with a B.S. must pass the exam in their first four semesters.

2. **PhD Qualifying Examination for students entering the program with an M.S.**

   Students entering the graduate program with an M.S. must pass the exam in their first three semesters.

   Students will be notified of the Ph.D. Qualifying Examination details via e-mail. This examination is described in detail in the Mechanical Engineering Department document,
Announcement and Study Guide: Ph.D. Qualifying Examination, which is published each semester and sent to enrolled students approximately two months in advance.

In the ME Department, it is an examination in three of seven topics (Controls, Fluid Mechanics, Heat Transfer, Machine Design, Mathematics, Thermodynamics, Vibrations and Dynamics) to determine the mastery of topics at the advanced senior level. Students may also request a special topic under limited circumstances. A special topic may be requested by those with a different background than the typical ME undergraduate from a course of comparable level. The special topic will be requested in the PhD qualifying exam form, stating their specific reasons for their request; the form must be signed by both the student and the advisor. The requests will be reviewed by the Graduate Program Committee and the candidates will be notified on whether their request has been approved on a case by case basis. If a student requests a special topic, the student must solve the problems offered in that topic at the exam.

All Ph.D. candidates must pass the examination. M.S. candidates who have the intention of applying to the Ph.D. program may also take the exam, as described in the previous section. The examination dates are typically set in two days at the end of October for the Fall semester and at the end of March for the Spring Semester.

See the Announcement and Study Guide: PhD Qualifying Examination for further information.

3. PhD Qualifying Exam for students who are not registered

Under special circumstances, students who are not currently registered Mechanical Engineering graduate students will be allowed to take the qualifying examination. Non-students who wish to take the exam should complete a PhD qualifying exam form and provide a written request explaining these circumstances to the Chair of the Ph.D. Qualifying exam no later than 5 weeks prior to the exam. The request will be considered by the a committee consisting of the Chair of the Ph.D. Qualifying Exam, the Chair of the Graduate Program Committee, and the Head of the Mechanical Engineering Department. The committee will reply to the student within 15 days of receipt of the request. If the request is granted, the Chair of the PhD Qualifying Exam will arrange for a faculty member to act as advisor to the student for purposes of the exam.

4. Appeal procedure

If a student doesn’t pass the exam, the student may request re-grading of one or more problems. To do this the student must complete a PhD qualifying exam form; the student and the advisor must sign the form confirming that the re-grading request is reasonable. Re-grading cannot be requested more than once for the same problems. The request must be done within 30 days after the release of the scores to the students. For each problem for which re-grading is requested the student must write a complete solution and a justification for the request. The
originals and the complete solution and justification should be returned to the Chair of the Qualifying exam, together with the signed PhD qualifying exam form mentioned earlier.

PLACEHOLDER FOR NUCLEAR ENGINEERING QUALIFYING EXAM

PHD PRELIMINARY EXAMINATION

The Preliminary Examination is an oral presentation given before the student's Examining Committee and is usually comprised of the Advisory Committee members. It is strongly recommended that the student prepare a written description of his or her proposed research in the form of a dissertation prospectus and distributes it to the members of the Examining Committee one to two weeks in advance of the examination. The purpose of the Preliminary Examination is to determine if the student is prepared to undertake the proposed research. Therefore, it is expected that the majority of the questioning would focus on the material contained in the dissertation prospectus, although the format of the examination can be modified at the discretion of the advisor. The Preliminary Examination should be held after the student has passed the PhD Qualifying Examination and before the student has made significant progress on the dissertation research. In any case, it must be passed at least six months (preferably nine months to a year) before the final defense and at least one-third of the required work (course work and research) must remain after passing the Preliminary Examination.

The Preliminary Examination must be scheduled through the Graduate School. The Graduate School requires a minimum of two weeks advance notice to schedule these examinations. The student must be in good academic status and have the Plan of Study up to date and approved by the ME department and the Graduate School before the Preliminary Examination can be scheduled. The Request to Admit Candidate to Preliminary Exam form is available for scheduling this examination on the Graduate School’s web site. The Graduate School will e-mail the Examining Committee to approve the Preliminary Examination. The ME Graduate Coordinator will e-mail the Examining Committee and the student the Ph.D. SACS Evaluation form, required by the College of Engineering and the University. The form should be promptly returned to 105 Randolph Hall or by email to the Graduate Program Coordinators. The Examination Committee must log onto the Electronic Signature Approval System (ESS) to the record the results immediately after completion of the examination.

VT-TUD DOUBLE ME MASTER OF SCIENCE PROGRAM

Upon successful completion of approximately one year of prescribed studies at each university, and upon successful completion of the requirements of each program, students will receive the degree of Master of Science in Mechanical Engineering from both universities. Interested students should refer to the Memorandum of Understanding (MOU) and Implementation Agreement (IA) document and the Dual Master of Science Programs web site for specific details and course requirements.
In this particular dual-degree program, the student will spend approximately one year in residence at each university. The first year will primarily be concerned with course work; the second year will have some course work, but will primarily be concerned with the thesis research. The student can choose the order of the two residencies; hence, two equivalent versions of the dual-degree program are described in the MOU and IA document.

The students should be prepared to complete the courses at Virginia Tech in English and the courses at the Technische Universität Darmstadt in German, though some courses and/or exams at the Technische Universität Darmstadt are occasionally offered in English at the discretion of the course professor.

**SELECTING AN ADVISOR AND COMMITTEE**

Each thesis Advisory and Examination Committee will have a co-chair and a member from each university’s Department of Mechanical Engineering. The student’s double-degree MS thesis Advising and Examination committee should consist of four members. Two of these members should be faculty members in the Department of Mechanical Engineering at Virginia Tech, and two should be faculty members Fachbereich Maschinenbau (Department of Mechanical Engineering) at the Technische Universität Darmstadt. One committee member from each university should serve as co-chairs and co-research advisors (major professors) to the student. TUD faculty must submit Graduate Program Faculty & Additional Committee Member Registration form to be added to a student’s committee if they have not already been approved to serve on VT Graduate Committees.

Students are expected to take the initiative to form their thesis Advisory Committee, starting with the major professors. Working with his, or her major professors, the student will be responsible for recruiting the two remaining committee members. The committee membership is by mutual agreement between the respective members and the student. When a student is employed as a graduate research assistant (GRA) or as a researcher, then the faculty member(s) providing the research funding will normally serve as the major professor(s).

The thesis Advisory Committee is furthermore responsible for working with the program coordinators, the Chair of the Virginia Tech Mechanical Engineering Graduate Committee, and the Studiendekan des Fachbereichs Maschinenbau (Mechanical Engineering Dean of Student Affairs) at the Technische Universität Darmstadt, to ensure that the requirements and standards of the double-degree M.S. program meet or exceed those of the regular M.S. ME programs at both Virginia Tech and at the Technische Universität Darmstadt, respectively.

**PLAN OF STUDY (POS)**

This program consists of 116-118 credit points (TUD CP) or 58-59 semester credit hours (VT) that are divided into 82-83 CP (41-42 semester credit hours) of course work and 34 CP (17 semester credit hours) of thesis research. The Technische Universität Darmstadt requires that
the student complete his or her research within six months of the official start date of the full-time thesis research activity.

Virginia Tech does not differentiate between courses that emphasize theory and methodology and those that emphasize applied engineering. Hence, the appropriate distribution of these courses taken at Virginia Tech is left at the discretion of the student’s thesis Advisory Committee, with the approval by the Chair of the Virginia Tech Mechanical Engineering Graduate Committee and the Technische Universität Darmstadt Studiendekan des Fachbereichs Maschinenbau (Mechanical Engineering Dean of Student Affairs) or their designees.

The student is expected to submit a draft plan of study by July 1st prior to commencing the double-degree MS program. This POS should identify the specific courses and the semesters in which they are to be taken, the major professors, and the general area of proposed research. For preliminary planning purposes, the draft plan of study should also indicate any requests for courses and/or exams to be offered in English at the Technische Universität Darmstadt. However, it should be noted that the faculty at the Technische Universität Darmstadt are under no obligation to honor such requests. The plan of study should be signed by the major professors to signify their approval of the plan of study and agreement to serve on the committee. The sample VT->TUD plan of study and sample TUD->VT plan of study can be found at: http://www.tud.vt.edu/MS/. A POS is only official when all of the courses are listed and signed off by the entire Advisory Committee.

The student is expected to submit an initial POS within one month of commencing the double-degree MS program. The plan of study should identify the specific courses and the semesters in which they are to be taken, the two major professors and the two supporting thesis committee members, and the general area of proposed research. The POS should be signed by the thesis committee to signify their approval of the plan of study and their agreement to serve on the committee. If the POS includes any requests for courses and/or exams to be offered in English at the Technische Universität Darmstadt, then the plan of study will also need the signatures of these respective course professors to signify their voluntary agreement to honor such requests.

The two major professors are responsible for providing guidance in defining a plan of study and in monitoring the student's progress. The student is responsible for arranging and meeting with his, or her thesis Advisory Committee and/or their designees at appropriate times. It is strongly recommended that the two major professors meet with the student (with the two other supporting committee members being invited, but not required to attend) when the student is starting his, or her research, to discuss the undertaking. The committee members and/or their designees should also meet similarly at least one other time when the student and the major professors feel that a significant portion of the research has been completed. A brief progress report, presentation slides, and a presentation by the student is expected. Subsequently, the two major professors are expected to provide a brief, joint statement assessing the progress of the student.
The student should meet with his, or her major professors and/or their designees on a regular basis to discuss the status of the graduate program. For a student enrolled in ME 5994 Research & Thesis, or ME 7994 Research & Dissertation, the failure to meet with his, or her major professors and/or their designees during the semester, may result in receiving no credit for those research hours.

To ensure a timely progress, an official start date for the full-time research effort will be established: For Program Alternative 1 (see Section 4.1 of the Memorandum of Understanding (MOU) and Implementation Agreement (IA) document.), where the research is predominantly completed at the Technische Universität Darmstadt, the start date will be set by the major professor at the Technische Universität Darmstadt in consultation with the major professor at Virginia Tech. For Program Alternative 2 (see Section 4.2 of the MOU & IA document), where the research is predominantly completed at Virginia Tech, the start date will be January 1. The student will be required to complete and defend their thesis within six months of that date.

The double MS students will be required to have at least six weeks (approximately 240 hours) of pre-approved industry internship experience, performing engineering research and/or development, during their MS studies. Alternatively, this requirement may be satisfied with at least six weeks (approximately 240 hours) of pre-approved university and/or national laboratory research in the field of engineering. Employment as a graduate research assistant (GRA) at either university may, if approved, count towards this requirement. It is suggested, but not required, that this experience be related to the area of the student’s intended MS thesis research topic. The student is ultimately responsible for obtaining this opportunity.

TRANSFER COURSES

Where appropriate, work done for one graduate degree program will be credited to the other program as well. Students must adhere to policies and procedures at each university related to transfer courses. The Virginia Tech Graduate Catalog lists the limitations & requirements for transferring courses on the plan of study. Official transcripts and course descriptions should be submitted with the Plan of Study.

VT-TUD FINAL EXAMINATION PROCEDURES

The student is ultimately responsible for observing and ensuring that the examination process and the quality and standard of the thesis document conform and meet the requirements of both universities. Where there is a conflict, as determined by the Examination Committee, the requirements and standards of the university of the second year of residence will prevail (the Technische Universität Darmstadt in the case of Program Alternative 1; Virginia Tech in the case of Program Alternative 2). The Examination Committee members should be presented with a final draft of the thesis at least 3 weeks prior to the examination. The final examination will be in English.
The thesis examination and the thesis will, with respect to Virginia Tech, be graded on a pass/fail basis, subject to the rules of examination at Virginia Tech. This includes the appointment of substitute examiners. This examination may be in person, by telephone, and/or by videoconference. The thesis examination and the thesis will, with respect to the Technische Universität Darmstadt, be graded on a numeric scale. The major professor at the Technische Universität Darmstadt will determine this grade in consultation with the rest of the thesis examination committee. Review the MS Final Examination Procedures for further information.

SHANDONG UNIVERSITY – VIRGINIA TECH COLLABORATIVE 3+2 BS/MS DEGREE PROGRAM

The Shandong University (SDU) – Virginia Tech Collaborative 3+2 BS/MS Degree Program is aimed at SDU students with exceptional promise as future researchers. Hence, the program is only open to students seeking a Master's of Science degree; it is not open to students who wish to pursue a Master of Engineering.

SDU undergraduate students wishing to enter the program must join the SDU-VT International Laboratory on SDU's Central Campus as undergraduate research assistants by the beginning of the summer after their second year (deadline: June 1 st) the latest – joining the International Laboratory earlier is possible and encouraged. Students in the program must work full-time in the International Laboratory for 11 weeks (i.e., 2 weeks vacation) during the summer between their 2 nd and 3 rd year; during the semester they must work in the lab for at least 5 hours per week. In the summer after their 3 rd year at SDU, they must work in the International Laboratory until leaving for the US (2 weeks vacation are possible).

Students who have joined the SDU-VT International Laboratory by the deadline given above are eligible to apply to the VT ME Graduate Program during their 3 rd year at SDU. Alternative evaluations to the GRE and TOEFL of research and English communication abilities based performance in the International Laboratory are available to these students. Students who pass these evaluations and maintain an acceptable SDU GPA (in general 80/100 minimum) can be admitted as tentative graduate students by the VT Graduate School after only 3 years at SDU and without an SDU BS degree.

At Virginia Tech, students in the collaborative 3+2 BS/MS are limited to taking courses that are open to regular VT graduate students. They can use some of course credits to complete the requirements for the SDU BS degree. Up to 9 credits can be double counted towards the SDU BS degree. Documentation of the awarded SDU BS degree has to be handed in to the VT Graduate School. After the documentation of the SDU BS degree has been accepted by the VT Graduate School, students in the program continue their studies at VT as regular MS students and can earn a VT Master's of Science degree upon completion of all requirements.
ETHICS REQUIREMENT

Since the fall 2014 semester, the Graduate School has implemented a “Scholarly Ethics & Integrity” requirement for graduate students entering a new program. For more information, refer to the Graduate Catalog. The Plan of Study will not be approved if the Ethics requirement has not been satisfied. A student cannot schedule a preliminary or a final exam and cannot graduate without satisfying the Ethics requirement. The student is required to enroll in a 1 credit hour Ethics course (GRAD 5014) offered by the Graduate School. Ethics courses taken from other departments may be approved to satisfy the Ethics requirement on a case-by-case basis by the Chair of the Graduate Program Committee.

SEMINAR REQUIREMENT

A seminar program for graduate students and faculty in the ME Department is held for presentations and discussions of recent and current developments in mechanical engineering and related areas. The seminar is generally of such a nature that one does not need to be a specialist in the area of the speaker, in order to benefit from the material being presented. All full-time graduate students are expected to attend the seminar during each semester in residence on the Blacksburg campus. The seminar cannot be used to meet degree requirements. Students should enroll in the one hour course as Pass-Fail every semester. Participation expectations will be communicated to students at the beginning of the semester. PhD students are encouraged to present one 25 minutes graduate seminar for the ME Department Seminar Series before graduating.

GRADE REQUIREMENTS

The student must pass all courses on the Plan of Study with an average grade of “B” or better. A student must repeat any subject with a grade below “C-“, if the course is on the Plan of Study. If a student’s work is substandard, the ME Departmental Graduate Program Committee may recommend to the Dean of the Graduate School that the student be dropped from the Graduate School rolls.

Particular attention is directed to the Graduate School rules concerning Pass-Fail (P/F) courses. All courses on the plan of study, including supporting courses, must be taken on a letter grade basis except for those courses offered on a P/F basis ONLY (such as all 5974 courses). Graduate students may take an unlimited number of hours of graduate work (5000, or 6000 level) on a P/F basis outside of the department and not on the plan of study, with the approval of the major professor. Auditing of courses is not recommended.

MATHEMATICS AND STATISTICS COURSES

Departmental mathematics and statistics requirements can be met by taking approved courses from the following list:
Mathematics Courses

All 4000, 5000 or 6000 courses from the Mathematics Department can be taken to fulfill
the departmental 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 can be taken to
fulfill the departmental mathematics requirements. Those courses are STAT:

5104, -14, -24, 5204, 5304, -14, -24, -34, -44
5404, -14, -24, -34, -44, -54, -64, -74, -84
5504, -14, -24, -34, -44, -54, -64, -74, -94
5605
5615, -16, 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 for that department, can be taken for graduate mathematics credit. Any CGEP
graduate level Math/Stat course is also acceptable.

Other acceptable engineering courses:

AOE 4084 Engineering Design Optimization
AOE 5984 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 5574 Nonlinear Systems Theory
ME 5744 Methods of Mech. Engineering Analysis
ME 5764 Modeling MEMS & NEMS
ME 5774 Intro. to Stochastics
ME 6574 Adaptive Control Systems
ME 6984 Spatiotemporal Chaos
MSE 5124 Materials Optimization Through Designed Experiments
NSEG 5134 Monte Carlo Particle Transport

Mathematics and Statistics Courses for Nuclear Engineering Degrees

NSEG 5134 Monte Carlo Methods for Particle Transport
ME 5744 Methods of Mechanical Engineering Analysis
ME 5774 Introduction to Stochastics
ME 6444 Verification and Validation in Scientific Computing
MATH 5435 Principles and Techniques of Applied Mathematics
MATH 5465 Numerical Analysis
MATH 5474 Finite Difference Methods for Partial Differential Equations
MATH 5485 Numerical Analysis and Software
MATH 5495 Mathematical Methods in Engineering
STAT 5104 Probability and Distribution Theory
STAT 5204 Experimental Design and Analysis I
STAT 5454 Reliability Theory
STAT 5615 Statistics in Research

GRADUATE PROGRAM REVIEW

Once a year, students and faculty will review the students’ progress towards the degree and provide a written evaluation for the students’ academic files. This is in accordance with Policy Memo 229. An e-mail reminder to submit the ME Graduate Student Annual Evaluation will be sent out at the end of spring term. Failure to submit the annual review in a timely fashion will result in a “HOLD” being placed on the students’ accounts, blocking registration.

FUNDING

Supported students are required to submit tax forms (federal and state) and the federal I-9 form which MUST be filled out PRIOR to the student beginning work. Proper forms of identification are needed to fill out the I-9 form: i.e., a valid driver's license, a social security card, a passport and/or a birth certificate, etc. The tax forms and I-9 form are usually distributed during the mandatory orientation, but funding may begin in the middle of a semester. If this is the case, you may fill out your tax forms and I-9 form with the Fiscal Technician, 456 Goodwin Hall.

All students, including supported students, are responsible for paying their comprehensive fees and should do so before the deadline to avoid late fee penalty. Funded graduate students who are registered for any classes should not wait for a “corrected” tuition bill before paying the comprehensive fees. Comprehensive fees and Parking Permits can be payroll deducted. The Engineering Fee and Capital Fee cannot be payroll deducted.
FINANCIAL OPPORTUNITIES

1. **Graduate Research Assistantships**
   Graduate Research Assistants (GRAs) are employed on a half-time basis (20 hrs/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 average twenty hours of work per week between academic terms.

2. **Graduate Teaching Assistantships**
   Graduate Teaching Assistants (GTAs) are employed on a half-time basis (20 hrs/week) to assist with the teaching of undergraduate courses in the Mechanical Engineering Department. GTAs are expected to report to the ME Department starting approximately one week before classes begin and continue through final exams.

3. **Fellowship and Traineeship Holders**
   Fellowship and traineeship holders are full-time graduate students and may have limited assigned university duties, specified by the fellowship/traineeship. Fellowship and traineeship holders should associate themselves with ongoing research projects and should expect to be treated like others who hold GRA positions. See Fellowship list.

4. **Instructors**
   Doctoral candidates, in addition to being eligible for fellowships, may on occasion be employed as full- or part-time instructors teaching undergraduate courses.

**STIPENDS**

Graduate teaching (GTA) and research (GRA) assistantship average stipends range from approximately $1752 - $2061 per month for half-time (i.e., 20 hours/week) appointments during the academic year. Stipends might include supplemental scholarships, which depend upon the student's academic record. The salary of instructors depends on their qualifications. The ME Department assumes the responsibility of paying the in-state tuition, engineering and technology fees, and 90% of health insurance (if it is purchased through the university) of all students supported on GTAs and GRAs. Students MUST enroll in a minimum of 12-18 hours of courses and/or research. The Graduate School waives the out-of-state portion for students with assistantships (NOT wages), who earn at least $2,000 each semester.

**OFFER LETTERS**

Your responsibilities, in connection with your assistantship and the details of the financial support which you will receive, are outlined in your offer letter from the department. GTAs will receive subsequent acknowledgement and assignment letters from the Graduate Program Chair and Assoc. Dept. Head for Undergraduate Studies approximately a week prior to classes. To maintain the assistantship during the specified period, students must complete
their assigned duties in a satisfactory manner and make satisfactory progress toward their degrees.

CONTINUED SUPPORT

If continued support beyond your current offer is desired, you should contact your Advisor at least two months before the end of the support period indicated in your offer letter. Details of your financial support should be discussed before this selection is finalized. Contracts cannot be continued without documentation by your advisor. US citizens and permanent residents are encouraged to fill out the Free Application for Federal Student Aid each Spring, as some available funding & fellowships are need based.

GTA ASSIGNMENTS

The GTAs are intended to support the instruction of various core laboratories and courses for undergraduate students. GTA offers are extended by the department primarily to new graduate students in their first year of graduate studies in the Department of Mechanical Engineering. If GTA positions are unfilled in a given semester, top priority is given for continuing PhD students in their last term of enrollment. The next priority is PhD students that passed the preliminary examination, followed by those who passed the qualifying examination and M.S. students who have indicated their interest and ability in the Ph.D. program by passing the Ph.D. qualifying examination. In addition, the type of past financial support of the students will also be considered in ranking the students nominated for GTA positions, with priority given to those that have been previously supported primarily on research funding. A few M.S. students may be offered GTA positions, too, based on the needs of the undergraduate courses to be covered. Current students are considered for GTA positions based on nominations by their primary advisor.

A small sampling of fellowships available for graduate students in Mechanical Engineering is:

*Please note: Application deadlines and funding levels may change from year to year.*

**External Fellowships**

ASME Graduate Fellowship & Scholarship Programs (various)
ASHRAE Scholarships & Graduate Students Grant-in-Aid
DOD SMART Fellowships (deadline generally Dec.)
DOE Office of Nuclear Energy Fellowships (deadline typically Feb.)
Edison Electric Institute
The Instrumentation, Systems, and Automation Society Scholarship
Link Foundation Energy Fellowship
NASA Graduate Student Researchers Program
National Defense Science and Eng. Graduate Fellowship (deadline generally Dec.)
NSF Graduate Research Fellowships
SAMPE Graduate Scholarship Award
Virginia Space Grant Fellowship
Whitaker International Fellows and Scholars Program
Yanmar/SAE Scholarship

Diversity/Minority Programs
Amelia Earhart Fellowship/Zonta International
American Association of University Women
ASME Graduate Fellowship & Scholarship Programs (various)
AT&T Fellowship for Minorities and Women
Clare Boothe Luce Program
Ford Foundation
GEM Program
NASA Graduate Student Researchers Program
NSF Minority Graduate Fellowships
SREB Doctoral Scholars Program
SWE Scholarships
The Olive Lynn Salembier Scholarship

Virginia Tech Fellowships:
See Graduate School’s Fellowship links.
Cunningham Doctoral Fellowship
Dean’s Diversity Assistantships
Virginia Tech Nuclear Engineering Fellowships (funded by NRC)

College of Engineering Fellowships – These are merit based fellowships. No application is required; students are nominated by the ME Department:
Mary Johns Fellowship
Davenport Fellowship
Pratt Fellowship
Walts Fellowship

Additional fellowship and scholarship information can be found at:
http://www.eng.vt.edu/gradstudies/fellowships and
http://graduateschool.vt.edu/financial/fellowships_scholarships

APPLICATION FOR DEGREE

The Application for Degree form can be obtained from the web, or filled out on Hokie SPA (preferred). It must be submitted by the deadline listed on the Graduate School’s web site, or on the Application for Degree form. Late submissions will result in the student’s name not appearing in the Commencement Bulletin and there may be a delay in receiving the diploma.
**FINAL EXAMINATION PROCEDURES**

Each degree candidate will take an oral final examination, which will cover not only his or her research, but also his or her general preparation in mechanical engineering. The report/thesis/dissertation must be distributed to the committee at least three weeks prior to the final examination. However, the committee may require more time to review the document. Students should review the Degree Completion and Commencement information for deadlines and procedures.

The Final Examination must be scheduled through the Graduate School. **The Graduate School requires a minimum of two weeks advance notice to schedule these examinations.** The student must be in good academic status and have the Plan of Study up to date and approved by the ME department and the Graduate School before the Final Examination can be scheduled. The Request to Admit Candidate to Final Exam for scheduling the examination is available on the Graduate School's forms web site. If registration is for Start of Semester Defense Exception, the minimum registration is for 1 hour and the defense should occur in the first five weeks of the term. **The Graduate School will enroll the student in GRAD 6864/7864 (Master/PhD) if they approve “Start of Semester Defense Exception” (SSDE).** Students may wish to take into consideration their student loans when applying for SSDE, since they will be classified as less than half-time. **Students on assistantships and fellowships must be registered full-time during the academic year.** If the Graduate School does not approve SSDE, the minimum registration is 3 hours of research. The Start of Semester Defense Exception form should be completed and returned to the ME Graduate Program Resources Office for processing at least three weeks prior to the defense. **Examinations can only be scheduled during regular academic sessions.**

After approval by the Graduate School, the student, the Graduate Coordinator, the Graduate Program Chair, and the Examining Committee (normally, the Advisory Committee) members will be notified via e-mail approximately 5 days before the examination. **A proxy may attend in place of an Advisory Committee member that 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. Once the exam is complete, the student should bring the appropriate SACS Accreditation Form to the ME Graduate Program Resources Office. **The examination should not be conducted if the Advisor has not received notification from the Graduate School that the examination has been approved.** If the e-mail notification has not arrived 2 days prior to the examination, the student should contact the Graduate Coordinator and the Graduate School to determine if there is a problem that must be resolved.

Generally speaking, the candidate will be asked to make a brief (about 30-50 minutes) presentation to the Examining Committee, highlighting some aspect of the work done. Approximately the first half of the examination will be devoted to examining the research document. The second half of the examination can, at the discretion of the Examining Committee, be more general in nature, and may draw from the student's background, including course work.
Attendance to the final examination is open to other faculty members of professorial rank. **However, with the agreement of both the candidate and the advisor, others may be invited to sit in on the presentation segment of the examination.** 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. Candidates will be questioned by members of the Examining Committee and by those faculty or other audience members who were invited by the Examining Committee to participate. The Examining Committee decides whether the applicant passes or fails. If a student fails, the Committee will indicate if the candidate may retake the examination. A repeat examination may not be scheduled earlier than the beginning of the following semester.

**OPERATIONAL NOTES AND POLICIES**

**E-MAIL AND COMPUTING RESOURCES**

Many events of importance are announced via e-mail. To access e-mail (using the popular Eudora, Google, Outlook, and NuPop packages, for example) you will need a Personal ID (PID). [Computing Services](#) web site contains many useful links and instructions.

On the College level, there is [The Center for High-End Computing Systems](#) that can be used for research by members of the [College of Engineering](#). [Advanced Research Computing](#) (ARC) operates high-performance research computing. For more information on equipment and laboratories, visit their web sites.

ARC also operates high-performance workstations with the latest software systems for research and teaching in the [VT CAD Laboratory](#), 114 E Randolph Hall. Contact: [Prof. Jan Helge Bøhn](#) for further information.

**BUILDING SECURITY**

Building security is everyone's responsibility. You should make sure to lock your office and laboratory doors when you leave (even for a few minutes). In the evenings and on weekends, building doors should not be propped open at any time. Do not bring personal items of value into the building. Students who compromise building security will be required to turn in their building keys immediately. Thefts occur. **Do not be careless about building security; you may be the next theft victim.**

**KEYS**

Building keys are issued to students at the discretion of their advisor. The advisor should e-mail the [Facilities & Operations Manager](#) with the request for keys and swipe card access to Goodwin Hall. All keys issued to students must be returned during their final check out. There will be a $5.00 charge for each key not returned.
MECHANICAL WORK

Shop orders should be made out clearly defining what is needed. Shop orders are available through the ME Trouble Ticket system. The order should be approved by the advisor, or project leader. The Shop Supervisor will assign the work to an appropriate staff technician.

SHOP HOURS: M-F 8:00 am – 4:45 pm
STAFF TECHNICIANS: Tim Kessinger, James Dowdy, Phillip Long, Bill Songer

PURCHASING, WORD PROCESSING, AND COMPUTER ACCOUNTS

All of these must be arranged through the advisor. Each faculty member has an assigned staff support person to assist with purchasing, travel, and reimbursements. Departmental staff members are not available to do word processing for graduate students. If a graduate student needs some word processing done, which arises from a sponsored research project on which he or she is working, the word processing should be given to the advisor. The advisor can then submit it according to regular departmental procedures. Only faculty and staff are authorized to use departmental letterhead in correspondence.

EQUIPMENT AND INSTRUMENT CHECK-OUT

Equipment needed for research and teaching activities can be signed out at the Instrument Shop window, Room 5 Randolph Hall. Graduate students are personally responsible for equipment signed out to them. Lending or borrowing of equipment between graduate students is prohibited. Instructional activities of the department have precedence over research activities for short term instrument use, except when the instrument has been specifically purchased for research use.

NOTES ON THESIS AND DISSERTATION PREPARATION

These notes are intended to be an aid to thesis and dissertation preparation, not to replace other instructions. The Graduate Catalog produced by the Graduate School should be read carefully; it is the final word. It is hoped that these notes will help in timing and writing, as well as clarify the role of the advisor and committee. Also, note that all M.S. theses and doctoral dissertations must be 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, can be written before the research is complete. The advisor and student should reach an agreement early in the research, on what work needs to be done. They should then agree when it is done and ready to be written.

TIMING

Probably more poor theses and dissertations result from improper timing than from any other single cause. All too often, students do not start intensive work on their theses and dissertations until it is too late to do a good job. The result, at best, is a poor thesis, or dissertation and a change in graduation plans. The Writing Center is an excellent resource that students should use.

The major events in preparation and submission of the thesis or dissertation (see Graduate Catalog) are:
1. Outline to Advisor -- this is the point where one begins writing, well ahead of the date s/he expects to graduate.
2. First draft to Advisor -- a considerable amount of alteration should be anticipated.
3. Final draft to Advisor -- this draft must be complete with title page, figures, etc. Misspelled words, typographical errors, poor construction, unnumbered pages, etc., make a draft unacceptable. Allow one week for the advisor and one week for corrections before the document is submitted to the Advisory Committee.
4. Thesis/dissertation to committee -- 3 weeks before the exam. The document must be complete and printed in final format at this point. Please note that faculty may request the final document before agreeing on a defense date.
5. Final Exam -- scheduled during the academic term. The Request to Admit Candidate to Final Exam must be submitted to the Graduate School office at least two weeks before the exam. Students should anticipate two weeks’ time between the exam and submission of the ETD for alterations.
6. Submission of 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 his/her responsibility. The student must plan and write the thesis/dissertation, with some organizational help from the major professor. Care must be taken 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 advisor and the Advisory Committee to help write and proofread the thesis, or dissertation.
The major advisor's role is one of advising. He or she should go over the outline and successive drafts with the student and give advice, not write, proofread, or check analyses. The advisor should expect neat, readable copies from the student, with plenty of room for comments.

The other Advisory Committee members will review the final copy only after it has been approved by the advisor. They will read it for general technical content and level of endeavor, and approve, approve with revision, or disapprove of it. 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 that must be followed are covered in the Graduate Catalog -- the student should be aware of these rules. Other rules are dictated by grammar and good taste in 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 are available to browse in the Digital Library & Archives. The format should be discussed with the advisor when the outline is complete.

A technical thesis or dissertation will normally include the following:

1. Title page (see standard form on the Graduate School web site).
2. Abstract -- should briefly describe the problem, the research program, and the main results.
3. Acknowledgments -- should acknowledge help in the research and thesis, or dissertation preparation.
4. Table of Contents -- list section headings and page numbers.
5. *List of Figures -- should list all figures with page numbers.
6. Nomenclature -- should define all symbols unless they are defined where they are used. Use standard symbols where possible. Units of physical quantities should be given.
7. Text.
   a. Introduction -- should define and give 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, it can be a separate section.)
   b. Body -- should include separate sections for experiment (equipment and procedure), analysis, discussion of results, etc.
   c. Conclusions and Recommendations -- should summarize the main conclusions and make recommendations.
8. References
9. Appendix (if used).
10. Vita

*Special attention should be paid to reproduced images, figures, etc. to meet copyright requirements. This often delays approval of ETD’s, resulting in delayed graduation dates.*
SUBMISSION OF THESIS/DISSERTATION TO GRADUATE SCHOOL

Note: Electronic submission of theses/dissertations (ETDs) is required. For instructions, see the Graduate School’s web site. The document should be submitted within two weeks following the final exam to avoid SSDE registration the next term.

A FINAL CHECK

The ME Final Check-out Sheet must be signed by those indicated and returned to the ME Graduate Program Resources Office, Room 104/105 Randolph Hall, before the graduate student can consider his, or her degree requirements fulfilled. This check out form is available on the ME web site. Students should write an itemized list of all equipment, books, computer programs, keys, etc., returned on the back of the form. It is strongly suggested that all students stop by the Graduate School’s Programs and Clearances Office, in the Graduate Life Center, to verify that all records are complete, before leaving campus. For more information on graduation procedures, please contact grads@vt.edu, Phone: (540) 231-8636 Fax: (540) 231-3714.

GRADUATE FORMS

ALL paperwork must be processed through the ME Graduate Program Resources Office, 104-105 Randolph Hall. Students should make a copy of all forms for themselves. An electronic copy of the forms will be kept in the academic file in the ME Graduate Program Resources Office. The Department Head gives signature authority on all graduate forms to the ME Graduate Program Chair (i.e., Associate Department Head for Graduate Studies). The ME Graduate Coordinator has access to the ME Graduate Chair’s signature stamp.

The following ME departmental forms can be downloaded.
Application Reference Form
ME Final Check-out Sheet
ME Graduate Student Annual Evaluation
ME Independent Study
Plan of Study
SACS Accreditation Form
UG-G ME Evaluation Form

Additional Academic forms available:
Grade Change Request Form

The selected forms listed below can be downloaded from the Graduate School’s web site:
Admissions

- Additional Required Information (All Applicants) 02/2009
- Application Fee Waiver 12/2013
- Application for Readmission 11/2013
- Application for Simultaneous Degree 08/2014
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<tr>
<th>Topic</th>
<th>Description</th>
<th>Date</th>
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<td>In-state Tuition Request</td>
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<td>International Application</td>
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<td>Payment Processing Form</td>
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**Enrollment**

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<tr>
<td>Academic Relief, Cook Counseling Center</td>
<td>(Withdraw for medical reasons) off-site link 08/2014</td>
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<tr>
<td>Academic Relief, Schiffert Health Center</td>
<td>(Withdraw for medical reasons) off-site link 08/2014</td>
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<tr>
<td>Application for Certificate</td>
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<td>Change of Campus</td>
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<td>Change of Graduate Program</td>
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<td>Start of Semester Defense Exception Request</td>
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<td>Graduate Course Withdrawal (WG)</td>
<td>(Use this form if you are only dropping one class, but are still enrolled in other classes) 08/2014</td>
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<td>Leave of Absence Request</td>
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<td>Name Change Form, Instructions</td>
<td>08/2014</td>
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<tr>
<td>Student Resignation/Withdrawal Form</td>
<td>(Use this form if you are dropping all classes) off-site link 08/2014</td>
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**Academic Progress**

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<td>Course Justification Request</td>
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<td>Plan of Study Change</td>
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<td>Request for Special Study</td>
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Request to Admit Candidate to Final Exam | 09/2012 |

Request to Admit Candidate to Preliminary Exam | 08/2014 |

Thesis Option Change Request | 08/2014 |

**Graduation**

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<td>International Invitation for Commencement Request</td>
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<td>(Request submission via HokieSPA Student Degree Menu)</td>
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<tr>
<td>Letter of Completion Request</td>
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<td>(Request submission via HokieSPA Student Degree Menu)</td>
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<td>ProQuest Agreement for Dissertations</td>
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