Mining & Minerals Engineering

Graduate Program Manual

A supplement to the
Graduate Policies & Procedures* and *Course Catalog
published by the Virginia Tech Graduate School

Revised Fall 2022

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NOTICE TO GRADUATE STUDENTS

This document supplements the Graduate Policies and Procedures and Course Catalog (available from the Graduate School). Every graduate student should have his or her own copy of this document and should read it carefully. If the answer to a question cannot be obtained from the Graduate Policies and Procedures and Course Catalog or this manual, the answer should be sought by asking their major advisor, the Mining and Minerals Engineering Graduate Program Director or Department Head, or the Graduate School—preferably in that order. The intention of this manual is to provide graduate students information which will be helpful in their graduate studies. This document is not intended to be legally binding.

The policies and procedures contained in and referred to in this document are subject to the graduate student appeals process as described in the university's Graduate Policies and Procedures and Course Catalog. General information on graduate study can be found at Virginia Tech's Graduate School website.

1.0 INTRODUCTION

The Department of Mining & Minerals Engineering at Virginia Tech offers Master of Science (M.S.), Master of Engineering (M. Eng.) and Doctor of Philosophy (Ph.D.) degrees in mining and minerals engineering. These degrees are designed to educate students for rewarding careers in industry, academia, and government. Graduate research may be pursued in several areas of specialization including rock mechanics, ground control, equipment evaluation, systems analysis, health and safety, mineral and coal processing, applied surface and colloid chemistry, conservation and the environment, mining ventilation, mine electrical systems, computer applications, and mineral economics. One or more of the topics may be emphasized within the department at a given time based on the ongoing research activity of the eight full-time research faculty members assigned to the department. Graduate students accepted to the program are generally provided financial support through sponsored grants, teaching assistantships or graduate fellowships. The graduate program also recognizes the specific needs of industry professionals with a program that strives to (i) upgrade technological skills of practicing engineers, (ii) encourage the pursuit of doctoral-level work, and (iii) provide an opportunity for advanced education and career reorientation. A major goal of the department is to afford all graduate students with the opportunity to participate in creative and challenging research projects, which typically lead to scholarly publications in international journals and conference proceedings.

The graduate program in the Department of Mining and Minerals Engineering (MME) is administered by the faculty. The Graduate Program Director (GPD) serves as chair of the Graduate Committee and is responsible for strategic initiatives related to graduate studies at the department level or in concert with the College of Engineering and the University. The Graduate Committee consists of several MME faculty members in addition to the GPD. The Committee is responsible for guiding program policies and procedures; periodic review of the program curriculum and standards, and program assessment; and for student admissions. The Department Head (DH) appoints the GPD, and approves nominations of Committee members. The DH and/or GPD must approve all petitions from MME to the Graduate School. The Graduate Program Coordinator (GPC) is responsible for maintaining student records, and thereby assists with student and program assessment.

2.0 APPLICATIONS AND ADMISSIONS

2.1 Deadlines

Admission to graduate study in the Department of Mining and Minerals Engineering is granted by the Graduate School after a recommendation of the Graduate Committee. The following table lists the admission deadlines set by the Virginia Tech Graduate School.

Application and Departmental Decision Deadlines

Deadline	Fall	Spring
Application:		
Domestic	Aug 1	Jan 1
International	April 1	Sep 1
Department Decision:		
Domestic	Aug 15	Jan 15
International	May 15	Oct 15

Applications received after the deadline will be considered on a case-by-case basis. ***Students seeking assistantships for Fall semester funding should normally submit all required admissions materials by February 1 for full consideration.***

In accordance with Council of Graduate Schools' "Resolution Regarding Graduate Scholars, Fellows, Trainees and Assistantships" (also known as the "April 15 Resolution"), offers of financial aid to prospective students for Fall semester must be open held through April 15 such that the student can consider all offers they may have received. In turn, the resolution binds students to their decisions made or held in place after April 15.

2.2 GRE Requirements

The Graduate Record Exam (GRE) is optional for applicants to the MME Graduate Program. All applications are evaluated in their entirety. GRE scores are not required. If an applicant opts to submit scores, they will be reviewed along with other materials. If an applicant does not submit scores, they will not be disadvantaged in the review process.

2.3 English-language Requirements

Non-US students or non-US permanent residents whose first language is not English, or who do not hold a baccalaureate degree from an English language university, are required to submit the results of the Test of English as a Foreign Language (TOEFL).

Minimum scores for admission are set by the Virginia Tech Graduate School. Students who will have teaching responsibilities, including as a teaching assistant (TA), may also be required to demonstrate English proficiency via procedures outlined by the Graduate School.

2.4 Application Review Procedures

All applications for graduate programs in the Department of Mining and Minerals Engineering are reviewed by the departmental Graduate Committee. Committee members conduct a holistic review, using all materials submitted by the applicant in their official application package. A positive decision regarding admission requires a majority vote by the committee.

Since M.S. and Ph.D. programs require extensive research, the Department recognizes that funding (typically via an assistantship) and a dedicated faculty advisor are critical to student success. Therefore, normally not all M.S. and Ph.D. applicants deemed acceptable by the Graduate Committee can be admitted in for a given term; in other words, capacity is limited in the programs by availability of funding and faculty time. For this reason, once the Graduate Committee has completed its review of applications, departmental faculty are also invited to review those that have been deemed acceptable to determine which applicants' experience and interests best align with specific research initiatives and funded assistantship opportunities. Moreover, the GPD and DH may review the list of acceptable applicants to identify individuals that may be eligible for special funding opportunities. Final decisions regarding admission of M.S. and Ph.D. students are based on both the Graduate Committee's holistic review of an application and the availability of funding and advising.

While M.Eng. students are typically self-funded, faculty advising is still important for student success. Final decisions regarding admission of M.Eng. students are based on the Graduate Committee's holistic review of an application and the overall capacity in the department's M.Eng. program.

2.5 Types of Admission

A student may be admitted to departmental graduate studies into one of the categories recognized by the Graduate School. The most common admission types are described below; the Graduate School's website should be consulted for other options.

2.5.1 Regular Status

Regular status admission to a graduate degree program is open to an applicant whose grade point average (GPA) meets or exceeds the 3.00 required by the Graduate School for the last half of the credits earned for the undergraduate (bachelors) degree and

whose academic background meets the requirements of the department. A graduate degree, or at least 12 credits of graduate coursework taken post-baccalaureate, while in graduate status, can be used to supersede the undergraduate record in evaluating credentials for admission. Students not having an adequate background in mining engineering will be expected to take make-up courses in areas of their deficiencies. Recommendations for such background courses are to be made by the Department Graduate Committee to the student's Graduate Advisor.

2.5.2 Provisional Status (M.S. Only)

Provisional status admission to the M.S. program is open to an applicant whose GPA is below the 3.00 required by the Graduate School, but generally not lower than 2.75, who has other experience or qualifications that demonstrate potential to undertake graduate study and whose admission is requested by the admitting academic unit. After attempting 12 graduate credits and earning at least a 3.00 GPA, a student is changed to Regular status by the Graduate School. If a 3.00 GPA is not earned in the first 12 credit hours attempted, the department will consult with the Graduate School to determine whether the student should be allowed to continue for one additional semester on probationary status. Appropriate coursework taken while on Provisional status may be included on the Plan of Study for the student's graduate degree at the discretion of the student's Advisory Committee. International students are generally not eligible for consideration for admission as provisional students.

2.5.3 Internal Ph.D. Applications

Internal applicants (i.e., those persons who have completed the master's program in the Department of Mining and Minerals Engineering at Virginia Tech) wishing to change admission from M.S. or M.Eng. to Ph.D. should follow the Graduate School's procedure to submit a Change of Degree Level Request form, which must be approved by the student's major advisor (Advisory Committee Chair) and either the GPD or DH.

2.5.4 Faculty/Staff Eligibility

Staff, administrative/professional faculty, and research associates may become candidates for graduate degrees with approval from the department, the university employer, and the graduate school. To receive approval, candidates must address conflicts of interest, time, and commitment. Supervisors of these candidates should abstain from chairing and/or serving on the candidates' graduate committees to avoid potential conflicts of interest.

3.0 Graduate Coursework for Undergraduates

3.1 Technical Electives for Undergraduate Credit

Undergraduate students pursuing a B.S. in Mining Engineering may enroll in MINE graduate courses to satisfy undergraduate degree requirements within the department. Where both a 4000 and 5000 level section of the course is offered, undergraduate students are generally expected to enroll in the 4000-level section, though a student may seek permission from the course instructor to enroll in the 5000 level section. Unless the student has been admitted to an accelerated undergraduate/graduate program (see below), the graduate level course cannot be used on the Plan of Study for a graduate degree.

3.2 Undergraduate/Graduate Dual Enrollment

Undergraduate students pursuing a B.S. in Mining Engineering, who have a GPA of 3.0 or better, may be eligible for Dual Enrollment Status during the final semester of their undergraduate degree. This status allows the student to take up to 6 credits of graduate level coursework (listed under MINE or another department) which can be used on the Plan of Study for a graduate degree—but which cannot be double-counted toward the B.S. degree.

To obtain dual enrollment status, students must follow the standard application procedures for the graduate degree program, and the student must be accepted into the program *before* the semester in which they intend to be dually enrolled (i.e., the final semester of the B.S program). The student must also complete and submit a Course Designation form prior to the semester in which they intend to be dually enrolled; this form designates the graduate level courses that should be recorded on the student's graduate transcript. For more information on dual enrollment application, admittance and course designation processes, the student should consult the Graduate School website.

3.3 Accelerated Undergraduate/Graduate Degree Programs

Undergraduate students pursuing a B.S. in Mining Engineering, who have a GPA of 3.3 or better, may be eligible for an Accelerated Undergraduate/Graduate (UGG) Degree Program. Like dual enrollment, this option allows the student to begin earning graduate coursework before completing the B.S. degree. However, the accelerated UGG program allows the student to earn up to 12 credits of graduate coursework in their final *two* semesters of the B.S. program. Moreover, courses that meet the program criteria can be double-counted toward both the B.S. and graduate degree.

As with the dual enrollment option, students wishing to pursue an accelerated UGG program must apply and be accepted to the graduate program before the first semester in which they intend to begin earning graduate course credit. They must also complete and submit the Course Designation form prior to that semester. Key program criteria are listed below. For more information on accelerated UGG program application, admittance and course designation processes, the student should consult the Graduate School website.

- There is no exception to the 3.3 overall minimum GPA requirement.
- A maximum of 12 credit hours that can be double-counted between the undergraduate and graduate degrees.
- No more than 6 credit hours of double-counted courses can be at the 4000 level. The balance must be graduate level 5000 or 6000 coursework. (The student should check the specific requirements of their intended degree program for additional guidance on coursework.)
- Courses that are explicitly required by the undergraduate degree program cannot be double-counted. However, technical electives can be used in the program.
- Only graded (A-F) courses can be double-counted, and the student must earn a "B" or better in each course taken while an undergraduate to be double-counted.
- The double-counted courses must be taken during the final two semesters (i.e., during the final academic year) of the undergraduate degree program.
- All double-counted coursework must be consistent with current MME policies for the appropriate graduate degree.

4.0 Financial Support

4.1 Graduate Assistantships

Graduate appointments with internal financial support are referred to as graduate assistantships. Graduate assistantships are often provided for M.S. and Ph.D. candidates (but not usually for M.Eng. students). A graduate assistantship typically includes a stipend and tuition waiver (for fall and/or spring semesters. Financial support for summer coursework school is handled on an individual basis.) The stipend can vary based on a number of factors, including the availability of funds, and performance of the student and progress toward degree requirements. Faculty are expected to make a best effort to maintain competitive stipends for the students they fund and supervise, and to follow guidance from the Graduate School with regard to funding steps and implementation of period increases to adjust for cost of living. Faculty have discretion to provide merit increases where appropriate.

Upon accepting financial support as a graduate assistant, a student normally is expected to perform assigned duties (e.g., research work, teaching, grading, etc.) for a minimum period of one academic semester. Assistantships are normally 20 hour per week assignments, and the student is supervised by a faculty member (typically the student's major advisor). The length of the assistantship period, work responsibilities and schedule is detailed on the assistantship contract, which must be signed by the student, supervisor and DH. If the student's work performance is not satisfactory, the assistantship (and associated financial support) may be discontinued. In addition, the student must maintain a GPA of 3.00 or better in all courses taken as a graduate student irrespective of whether or not the courses are listed on the Plan of Study. Financial support may be extended on a periodic basis, within the guidelines of the Graduate School, upon mutual agreement of the student and supervisor.

There are three categories of graduate student appointments with financial support:

- Graduate Assistant (GA): GAs are supported by university funds.
- Graduate Teaching Assistant (GTA): GTAs are supported by university funds and help support the teaching activities of the department.
- Graduate Research Assistant (GRA): GRAs are supported by funds from a faculty member's research program.

Funding and work periods for GAs and GTAs are normally based on the academic year (August 10 through May 9). Funding and work periods for GRAs are often based on a calendar year.

4.2 Other Financial Support

Graduate students may also pursue merit and need-based scholarships and fellowships, including those internal to the University and those from external sources. Scholarships and fellowships that include funds for tuition may make the student ineligible for standard assistantships (i.e., which include tuition waivers). However, where appropriate and funds are available, the student's major advisor or supervisor or the Department may use discretionary funds to supplement the student's fellowship-provided stipend. Such situations are handled on a case-by-case basis.

5.0 STUDENTS WITH NON-TRADITIONAL ACADEMIC BACKGROUND

5.1 Preparatory Course Requirements

A graduate student that does not hold an undergraduate degree in engineering is required to take preparatory courses at the undergraduate level, which are offered by the Department of Mining and Minerals Engineering. These courses must be taken for graded credit (A-F) and may not be used toward required coursework for the graduate Plan of Study; rather, the preparatory courses should be listed on the Plan of Study as *supporting courses*. The student should select the specific courses in consultation with their major advisor to support (a) a broad background in the mining and minerals engineering discipline, and (b) the particular focus area of their research and/or career interests. *In most cases*, the student is required to take 12 credits of preparatory courses to meet the criteria listed in the table below.

For a student with substantial prior coursework (e.g., in geosciences, applied chemistry, environmental sciences) or practical experience related to mining or minerals engineering, up to 6 credits of the preparatory coursework requirements might be waived. To request a review for a waiver, the student is required to submit a written request to the Graduate Committee. The request must include:

- Documentation of prior coursework related to mining or minerals engineering, the student's transcript showing the grade(s) earned in the related course(s), and a syllabus comparison between the related course(s) and the MINE course(s); or documentation of the practical experience related to mining or minerals engineering, a narrative description of the experience and justification as preparatory for the graduate degree, and a letter of support from a supervisor where applicable.
- A brief statement of support for the waiver signed by the student's major advisor.

Preparatory coursework requirements for non-traditional students pursuing a graduate degree in Mining Engineering

Must include:

- MINE 2504: Introduction to Mining Engineering

Must include at least one of these courses:

- MINE 3604: Mining Geomechanics
- MINE 3664: Fluids and Thermodynamics for Resources
- MINE 3634: Fundamentals of Mineral Processing
- MINE 3584: Ventilation Engineering

Must include at least two additional courses*:

- MINE 2564: Resource Exploration and Design
- MINE 3564: Underground Mine Design
- MINE 3574: Surface Mine and Quarry Design
- MINE 3604: Mining Geomechanics
- MINE 3664: Fluids and Thermodynamics for Resources
- MINE 3634: Fundamentals of Mineral Processing
- MINE 3584: Ventilation Engineering
- MINE 3624: Mineral Resource Project Management
- MINE 3644: Applications in Mineral Processing
- MINE 3674: Explosives and Rock Fragmentation
- MINE 4504: Materials Handling and Power Systems
- MINE 4614: Health and Safety Systems
- MINE 4624: Mine Water and Reservoir Engineering
- MINE 4654: Mine Power Systems and Automation

**If a student wishes to take as preparatory coursework another 3000 or 4000 level MINE course which is not listed above, the student must make a written request to the GPD and receive written approval.*

Students should consult the undergraduate and graduate catalog to determine prerequisites for any courses specified. While the student may be exempt from internal course prerequisites based on prior education, knowledge, or experience, they are still responsible for the content of material covered in the prerequisite courses. Students without sufficient mathematics and engineering background are highly encouraged to consider taking these supporting courses prior to attempting courses with prerequisites.

6.0 DEGREE REQUIREMENTS

6.1 Student Responsibilities

All students are expected to be knowledgeable of and to comply with all university and departmental graduate regulations as stated in this document and Graduate School's official policies and procedures.

6.2 Advisor and Advisory Committee

6.2.1 Graduate Advisor

A student's major advisor (i.e., Advisory Committee Chair) provides guidance in completing a Plan of Study and in conducting the design of thesis or dissertation project required of each graduate candidate. In many cases, the advisor also serves as a research supervisor if the student is being funded on a GRA.

Before registration for the second semester of study, each graduate student must confer with members of the faculty and obtain an agreement with one to serve as the student's advisor. The student is expected to take the initiative in determining their major advisor. The DH or GOD will appoint a temporary advisor during the first semester of study for those students who have not made prior arrangements.

It is recommended that a student meets with their advisor at least monthly to provide updates on their academic and research progress, ask questions, and receive feedback. This is critical to ensuring that the student is progressing, and that equivalent grades can be properly documented for "research and thesis" or "research and dissertation" credits.

6.2.2 Advisory Committee Members

The function of the student's Graduate Advisory Committee is to approve the Plan of Study, provide advice and periodically assess progress. An Advisory Committee should be selected during the first two semesters of study. An M.S. or Ph.D. student and their advisor jointly select the other members of the Advisory Committee, and the student is responsible for obtaining their agreement to serve; for an M.Eng. student, the Advisory Committee may be appointed by the DH or GPD. Acknowledgement that all committee members agree to serve is formally documented on the Plan of Study. Selection of Advisory Committee members must be done in accordance with the Graduate School's policy on Graduate Program Faculty. An M.S. committee should consist of three members (including the Chair) and a Ph.D. committee should consist of four members (including the Chair). All members must be approved by the Graduate School as Graduate Program Faculty; for individuals who have not been previously

approved, the student is responsible to nominate the individual. In general, the Department encourages one member of a Ph.D. committee to be externally affiliated. The M.S. or Ph.D. student and their advisor are responsible for arranging meetings of the Advisory Committee at appropriate times. It is strongly recommended that an Advisory Committee meets when the student is just starting their research to discuss the scope and general approach, and then as necessary to report on progress and seek input as the thesis or dissertation is being drafted. In general, a student is expected to meet with their committee members at least once per semester.

6.3 Plan of Study

6.3.1 Plan of Study Requirements

All graduate students must submit an approved Plan of Study. The program must meet the minimum requirements for the particular degree being sought and must be approved by the student's Graduate Advisory Committee, the GPD or DH, and the Graduate School. All courses on the Plan of Study, including supporting courses, must be taken on a letter grade basis (A/F) except for those courses approved to be graded on a pass-fail (P/F) basis only. Audit courses cannot be included on the Plan of Study. All courses listed on the Plan of Study are requirements for the degree and must be completed with a grade of "C-" or better; this includes courses listed as supporting courses as described below.

For M.S. candidates, the Plan of Study is due by the end of the second academic semester (based on full time enrollment of 12 credits per semester). For B.S./M.S. students, the Plan of Study is due by the end of the first full semester of graduate study. The Plan of Study for Ph.D. candidates is due by the end of the third academic semester (based on full time enrollment).

6.3.2 Requesting a Plan of Study

Students should obtain an electronic Plan of Study template from the GPD, and complete it following consultation with their advisor. In general, coursework should be selected to (a) support broad knowledge in the mining and minerals engineering discipline, (b) support the student's planned research, and (c) support the student's longer term career interests. Once the form is completed, it should be submitted to the student's major advisor, Advisory Committee members, and finally to the GPD or DH for signatures. After this initial review and approval, the Plan of Study should be submitted to the GPC so that it can be entered and submitted to the Graduate School for final approval. The student is advised to check their online record periodically until they see that the Plan of Study has been approved.

6.3.3 Changes to Plan of Study

A change in the Plan of Study is necessary whenever the student's planned coursework or research deviates from the original program approved by the Graduate School. Changing the Plan of Study requires the student to complete a new form which must be again routed for signatures. Students should consult the Graduate School website for the appropriate form and submission portal.

6.3.4 Transfer Courses

Per Graduate School policy, no more than 50% of the graded credit hours needed to satisfy the requirements for a graduate degree may be transferred in from an accredited university. The student must have earned a grade of "B" or better in any transferred course, while in good standing in graduate status at the university, and only graduate courses (numbered 5000 or higher) may be transferred. All transfer courses must be acceptable to the student's Graduate Advisory Committee and the GPD or DH. To facilitate the approval process, students should attach a statement containing the syllabus and description of the courses they wish to transfer, the numbers and catalog descriptions of the Virginia Tech courses which most nearly match (if applicable), and the transcript showing a grade of "B" or better (or equivalent). For coursework more than five years old, the student should consult Graduate School policy for requirements to justify the transfer(s).

Credits from other universities are transferred to a Virginia Tech graduate degree at the time the Plan of Study that includes those courses is approved by the Graduate School. Transferred courses count only as credit hours and are not included in the calculation of the Virginia Tech GPA. Official transcripts are required before transfer course work can be approved for the Plan of Study. Research, Project and Report, Practicum or Internship credit hours may not be transferred in from another university to meet Virginia Tech graduate degree requirements (i.e., they cannot be included on the Plan of Study).

6.3.5 Supporting Courses

Supporting courses are those the student's Advisory Committee considers necessary to provide missing background for taking the key courses required for the student's degree program. Courses numbered lower than 4000, or those designated as preparatory per the above section, can only be used on the Plan of Study as supporting courses. Supporting courses do not count toward the minimum number of credit hours required for the degree.

6.3.6 Double-counting Credits

In some cases, students pursuing multiple degrees (or certificates) at Virginia Tech may double-count course credits. This applies to Ph.D. students who wish to use credits from their Master's Plan of Study, in which case the student may list all graded coursework from the Master's Plan of Study on their Ph.D. Plan of Study—so long as the course levels and earned grades meet the Ph.D. program requirements.

Students enrolled in an accelerated UGG program may also double-count courses (i.e., toward the B.S. and graduate degree) which are taken while in UGG status in accordance with the program guidelines stated above. Again, the course levels and earned grades must meet the B.S. and graduate program requirements. Credits taken while in undergraduate status or for an undergraduate degree (while not in UGG status) cannot be used toward a graduate degree Plan of Study.

Ph.D. and Master's students pursuing a graduate certificate offered by Virginia Tech during their degree program may also double-count credits for the certificate toward the degree (i.e., on their Plan of Study), *if those credits are deemed appropriate for the degree by the student's advisory committee*.

Triple-counting of courses (e.g., toward B.S., Master's and Ph.D.) is not allowed under any circumstance.

6.4 Credit Hour Requirements

6.4.1 Thesis (M.S.) Degree

The student's Plan of Study for a M.S. degree must meet the minimum total credit requirements of 30 credit hours and minimum graded credits of 20 credit hours. A minimum of 6 credit hours of Research and Thesis (MINE 5994) must be taken at Virginia Tech. The degree must include the preparation of a written thesis that involves original research/scholarship. Graded credits must be taken for an A/F grade unless the course is only offered pass/fail (P/F). The credits may include a maximum of 6 credits of Virginia Tech 4000-level undergraduate course work. The 6 credits of Virginia Tech 4000-level course work may include Special Study (4984) courses but may not include Undergraduate Independent Study (4974) or Undergraduate Research (4994) courses. All other graded coursework must be 5000 level or higher (i.e., graduate coursework). The 5000-level course work may include a maximum of 6 credits total in 5974, 5984, and 6984 courses and 2 credits of seminar.

6.4.2 Non-Thesis (M.Eng.) Degree

The student's Plan of Study for a M.Eng. degree must meet the minimum total credit requirements of 30 credit hours and minimum graded credits of 24 credit hours. The

total may include a maximum of 6 credits and minimum of 3 credits of Project and Report (5904) credits taken at Virginia Tech. The total may include a maximum of 6 credits of Virginia Tech 4000-level undergraduate course work. The 6 credits of Virginia Tech 4000-level course work may include Special Study (4984) courses, but may not include Undergraduate Independent Study (4974) or Undergraduate Research (4994) courses. All other graded coursework must be 5000 level or higher (i.e., graduate coursework). The 5000-level course work may include a maximum of 6 credits total in 5974, 5984, and 6984 courses and 2 credits of seminar.

6.4.3 Doctoral (Ph.D.) Degree

Doctoral degrees at Virginia Tech must meet the minimum semester credit hour requirements of 90 hours for total credit hours and 30 credits for graded coursework. A minimum of 30 credit hours of Research and Dissertation (7994) is required. The degree must include the preparation of a written dissertation that involves original research/scholarship. Graded course work on the Plan of Study must be taken for an A/F grade unless the course is only offered P/F. At least 27 graded credits must be at the 5000 level or higher (i.e., graduate coursework). The Plan of Study may include a maximum of 6 credits of Virginia Tech graded 4000-level undergraduate course work. The 6 credits of Virginia Tech 4000 level course work may include Special Study (4984) courses but may not include Undergraduate Independent Study (4974) or Undergraduate Research (4994) courses. The 5000-level course work may include a maximum of 18 credits total in 5974, 5984, and 6984 courses and 4 credits of Graduate Seminar.

In accordance with the definition of doctoral degrees as involving mastery of intellectual principles, development of original scholarly contributions to the chosen field or fields, and critical evaluation of issues and problems in relevant disciplines, residency is required for all doctoral students at Virginia Tech. Residency for doctoral degree programs (PhD) can be accomplished via two consecutive semesters of full-time enrollment. Students completing residency via full-time enrollment should understand residency goals and plan not only to complete required courses, but also to sustain scholarly engagement and immersion in research, scholarship and professional development. All doctoral students should indicate the mechanisms by which they plan to earn residency on the Plan of Study form. Should a change in residency plan be required, students can seek approval of such change via the Plan of Study Change form accompanied by relevant documentation.

6.4.4 Seminar Requirements

All full-time graduate students are required to register for and to attend a 1-hr seminar during each semester of enrollment. During a single semester, the student is required to enroll in a seminar that satisfies the Graduate School's requirement for diversity and inclusion training; students should consult with the GPD to determine which seminars meet this requirement. During other semesters, students are expected to enroll in the MINE 5944 seminar. If the student has a scheduling conflict or legitimate reason to enroll in a seminar in another department, they may seek permission from their major advisor and the GPD or DH to enroll in an alternate seminar.

6.5 Transfer of Credits

Graduate courses taken at other institutions can be included in the Program of Study under the conditions described in the Graduate Policies and Procedures and Course Catalog. To facilitate the approval process, students should attach a statement containing the syllabus and description of the courses they wish to transfer, the name of the textbooks used (copies of textbooks if possible), and the numbers and catalog descriptions of the Virginia Tech courses which most nearly match the courses they wish to transfer.

6.6 Time Limits

Coursework more than five years old at the time of submission of the Plan of Study must be revalidated to count toward a graduate degree. Coursework on the Plan of Study must be completed within five years after approval of the plan of study or revalidated to count towards the Master's degree. Coursework on the Plan of Study must be completed within seven years after approval of the plan of study or revalidated in the preliminary examination for the Ph.D. has not been completed by then.

6.7 Academic Eligibility

The university requires that candidates for graduate degrees maintain a 3.0 quality credit average (QCA) computed over all courses taken for graduate credit. A student who fails to maintain a 3.00 will be placed on departmental probation. Students must raise their average above 3.00 during the next academic semester to be removed from probation. Failure to regain regular status is grounds for dismissal. Failure to maintain a 2.0 average during any single semester is also grounds for dismissal. Transfer courses are not used in the computation of university or departmental QCA.

7.0 DISSERTATION, THESIS AND REPORT

7.1 General Requirements

7.1.1 Thesis and Dissertation (M.S./Ph.D.)

The Department of Mining and Minerals Engineering requires submission of a thesis (M.S.) or a dissertation (Ph.D.) which consists of a written report of the student's research. Requirements for thesis or dissertation preparation are specified in the Graduate School's Policies and Procedures. The candidate must deliver one final copy of the thesis to each member of the Advisory Committee at least two weeks before the date of the final examination.

7.1.2 Project Report (M.Eng.)

A report on an engineering project undertaken by the student must be prepared and submitted to the student's Advisory Committee. Editorial standards and graduate school requirements are the same as those for theses. The report must be approved by the Advisory Committee in order to satisfy degree requirements. Copies of the project report must be submitted to the committee at least two weeks before the scheduled time of the final examination.

7.2 Examination Procedures

7.2.1 M.S. and M.Eng. Final Examinations

Each M.S. candidate will take an oral final examination. The final examination must be scheduled through the Graduate School at least two weeks in advance of the exam date. At the final examination, the candidate is expected to make a public presentation regarding the important aspects and results of their research. The Advisory Committee is then tasked, in closed session, to question the candidate about their research thesis and also the student's general preparation in mining and minerals engineering. On the basis of the candidate's performance in the examination, the committee will determine whether the student has passed or failed. To pass the final exam, the student is allowed at most one unsatisfactory (fail) vote. If a student fails an examination, one full semester (a minimum of 15 weeks) must elapse before the second examination is scheduled. Not more than two opportunities to pass any one examination are allowed. A student failing any of the examinations required by Graduate Policies two times will be dismissed from graduate studies by the Graduate School.

As a separate vote, the Advisory Committee will also decide whether the student's thesis should be approved. For the thesis to be approved, the student is allowed at most one non-approval vote. In the event of an approval decision, the committee shall indicate any minor revisions which may be required in the thesis–and these are

normally required to be completed and a final, revised version of the thesis sent to the committee for final approval within two weeks of the final exam. In the event that one member of the Advisory Committee still does not approve of the thesis, their non-approval will be marked on the electronic copy of the thesis.
Non-thesis (M.Eng.) candidates also take a final oral examination similar to that taken by an M.S. candidate, except that the first part of the examination will center on the Project and Report instead of a thesis. For the M.Eng. final exam, the student's advisor will serve as the examining committee chair, and at least two other members will be appointed by the GPD. On the basis of the candidate's performance in the examination, and the overall quality of their project report, the committee will determine whether the student has passed or failed. To pass the final exam, the student is allowed at most one unsatisfactory (fail) vote. If a student fails the examination, one full semester (a minimum of 15 weeks) must elapse before the second examination is scheduled. Not more than two opportunities to pass any one examination are allowed. A student failing any of the examinations required by Graduate Policies two times will be dismissed from graduate studies by the Graduate School.

7.2.2 Ph.D. Qualifying Examination

A qualifying examination is used to evaluate subject mastery, to determine deficiencies, and to determine whether the student should continue into dissertation research. The results of the qualifying exam are made part of the student's departmental record. The qualifying exam must be completed within their first two semesters of enrollment. If a student does not pass the exam on their first attempt, they must attempt the exam for a second time during the following semester.
The GPD administers the qualifying exam, including formally appointing members of the Examining Committee and notifying the student of the outcome (pass/fail). This committee consists of three departmental faculty members jointly agreed upon by the graduate student and GPD; the student's Advisory Committee chair and the GPD are not eligible. Once the student and GPD have agreed on a list of appropriate committee members, it is the student's responsibility to confirm that each individual is available to serve—and to schedule the exam by written request (email) to the GPD.
To schedule the exam, the student should consider the timing of both the written and oral portions as follows. The qualifying exam consists of two parts: (1) A written critical review of a recent journal paper (or similar), and (2) an oral exam. The student has exactly one week to submit the written portion, and the oral exam should be scheduled no more than two weeks following that submission.

The written critical review will be assessed by the Examining Committee prior to the scheduled oral exam. For the oral exam, the same committee will serve. The oral exam will include questions related to the written critical review as well as general topics in mining and minerals engineering. The student should prepare a brief presentation of their written review to begin the oral exam.

To pass the qualifying exam, the student must pass ***both*** portions (written and oral) by majority vote of the examining committee. If a student fails the qualifying exam, they must retake the exam during the next regular academic semester (fall or spring). Not more than two opportunities to pass the qualifying exam are allowed. A student failing the qualifying exam two times may be dismissed by the MME Graduate Committee or advised to pursue an alternate program.

7.2.3 Ph.D. Preliminary Examination

The preliminary examination is a requirement for all doctoral students. This exam is used to present the student's proposed research plan, preliminary results, and other progress toward degree to the Advisory Committee, and thus represents an important opportunity for the student to obtain critical feedback necessary for successful completion of degree requirements. This examination must be taken at least six months before the final examination. At least 24 hours of coursework and/or research must remain to be taken, including work for which the student is currently enrolled.

The preliminary exam consists of two parts: (1) a written literature review and/or research proposal for the dissertation topic, and (2) an oral presentation and defense of the proposed research plan and preliminary results. There is not a required format for the written exam, however students are strongly encouraged to follow proposal guidelines for common research funding agencies (e.g., the National Science Foundation) or standard author guides for review-type manuscripts. The student should consult their Advisory Committee well in advance of the written exam due date for more specific guidance.

For the oral exam, the student should prepare a presentation of their dissertation topic, proposed research plan and timeline, and any preliminary results. The student should briefly update the committee on their coursework progress as well. Questions from the committee should primarily focus on the material contained in the written exam and presentation, although the student's Advisory Committee Chair maintains discretion to allow broader questioning.

The preliminary exam must be scheduled through the Graduate School using their online form at least two weeks in advance of the scheduled exam date. Likewise, the written portion of the exam must be provided to the Advisory Committee at least two weeks prior to the scheduled exam date. It is the student's responsibility to find an

agreeable date and time for the oral portion of the exam, when all members of the Advisory Committee are available.

The Advisory Committee determines if a student passes or fails the preliminary examination. The resulting outcome can be pass, conditional pass, or fail. To pass the preliminary exam, the student is allowed at most one unsatisfactory (fail) vote. If a student fails the exam, one full semester (a minimum of 15 weeks) must elapse before the second examination is scheduled. Not more than two opportunities to pass any one examination are allowed. A student failing any of the examinations required by Graduate Policies two times will be dismissed from graduate studies by the Graduate School.

7.2.4 Ph.D. Final Examination

The Ph.D. final examination must be scheduled through the Graduate School, at least two weeks in advance of the exam date. The final examination for Ph.D. candidates is centered on the defense of the dissertation. This exam is advertised in advance. The candidate's presentation is open to all members of Virginia Tech's academic community. However, after the completion of the presentation, questioning by the Advisory Committee is performed in closed session.

On the basis of the candidate's performance on the examination, the committee will determine whether the student has passed or failed. To pass the final exam, the student is allowed at most one unsatisfactory (fail) vote. If a student fails an examination, one full semester (a minimum of 15 weeks) must elapse before the second examination is scheduled. Not more than two opportunities to pass any one examination are allowed. A student failing any of the examinations required by Graduate Policies two times will be dismissed from graduate studies by the Graduate School.

As a separate vote, the Advisory Committee will also decide whether the student's dissertation should be approved. For the dissertation to be approved, the student is allowed at most one non-approval vote. In the event of an approval decision, the committee shall indicate any minor revisions which may be required in the dissertation– and these are normally required to be completed and a final, revised version of the dissertation sent to the committee for final approval within two weeks of the final exam. In the event that one member of the Advisory Committee still does not approve of the dissertation, their non-approval will be marked on the electronic copy of the dissertation.

8.0 SATISFACTORY PROGRESS

8.1 Degree Benchmarks

8.1.1 M.Eng. Degree Benchmarks

The following indicate typical times required to reach important benchmarks of the non-thesis (M.Eng.) graduate degree. All times are reported in reference to the time since official admission to the department graduate program.

- 0-6 months Select thesis advisor, Advisory Committee
- 0-12 months Submit Plan of Study
- 12-18 months Submit Project Report

The following indicate typical times required to reach important benchmarks of the thesis (M.S.) graduate degree. All times are reported in reference to the time since official admission to the department graduate program.

- 0-6 months Select thesis advisor, Advisory Committee
- 0-12 months Submit Plan of Study
- 12-24 months Defend thesis

The following indicate typical times required to reach important benchmarks of the doctoral (Ph.D.) graduate degree. All times are reported in reference to the time since official admission to the department graduate program.

- 0-6 months Select dissertation advisor, Advisory Committee
- 0-6 months Submit Plan of Study
- 0-12 months Pass Qualifying Exam
- 12-24 months Pass Preliminary Exam
- 36-48 months Defend dissertation

8.2 Performance Evaluations

Every calendar year, the student should complete and submit to their major advisor a Graduate Activity Report. The report template is available from the GPD and is used to briefly document the student's annual academic and research progress, as well as major professional development activities. The student is generally requested to submit the activity report to the advisor by the middle of February for the previous calendar year.

Based on the submitted activity report and other observations by the advisor, the advisor should prepare a brief written review of the student's progress. The student should be given the opportunity to read, review and respond to the advisor's

evaluation, including via a dedicated discussion meeting. The evaluation becomes part of the student's departmental record.

9.0 GUIDANCE AND FORMS

9.1 Guidance

The student is required to attend both departmental and Virginia Tech Graduate School orientation events at the beginning of their first term of enrollment. These events provide important information about requirements and resources for graduate students. Additionally, students in mining and minerals engineering are expected to attend the departmental orientation event annually as a refresher.

The GPD will make department-specific forms and information available to all graduate students. After a student has consulted the provided information, they should contact their major advisor or the GPD for further questions or clarification.

International students should also be aware of the services and resources available through the Cranwell International Center.

9.2 Graduate School Forms

Most forms are available on the Graduate School website, including those required to: request changes to a Plan of Study, the Advisory Committee membership, or degree program or level (e.g., M.S. to Ph.D.); request a leave of absence, in-absentia, or other changes in status; request a start of semester defense or other exception to enrollment requirements; request tuition reduction based on candidacy status (i.e., for Ph.D. students who have passed their preliminary examination); apply for degree and notify the University of plans to participate in commencement ceremonies. The Graduate School also has a dedicated system for scheduling preliminary and final exams. Students should consult the Graduate School website for current forms and instructions for submission.

9.3 Departmental Forms

Several forms originate, or remain completely, within the Department of Mining and Minerals Engineering, including: the Plan of Study template, and the Ph.D. qualifying examination. Students should consult the GPD for current forms and instructions for submission.