LEHIGH UNIVERSITY

Materials Science & Engineering

Graduate Student Handbook

2024-2025

P. C. Rossin College of

Engineering and Applied Science

(8/29/24)

Welcome from the Chair:

To our graduate students:

Welcome to the Materials Science and Engineering graduate program at Lehigh University. We are one of the most traditional Materials programs in the country, with over 134 years of history working as a solid foundation for the cutting edge research developments we can offer to you today.

This handbook has been prepared for the 2024-2025 academic year to help you navigate our curriculum and lead you to success. Objectively, this document is designed to supplement but not supersede the College of Engineering and Applied Sciences Graduate Student Handbook. I advise you to refer to the University Catalog and Graduate Student Handbook for complete information, located at https://engineering.lehigh.edu/academics/graduate/student-handbook.

The Materials Science and Engineering Department strives to provide an inclusive environment and supports and encourages diversity and equity. If you ever face challenges during the exciting times you're with us, please do not hesitate to contact me personally or one of our faculty or staff. We want to make sure you feel welcome and have everything you need to be successful.

On behalf of the Department faculty and staff, I welcome you to Lehigh and trust that you will have a successful and rewarding experience during your studies in the Department of Materials Science and Engineering.

Ricardo H. R. Castro
Department Chair

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1.0 PROCEDURES FOR NEW GRADUATE STUDENTS

1.1 Check in and Starting dates

Students are expected to be on campus at least two weeks prior to the start of classes in time for new student orientations, testing and registration. International students must report to the Office of International Students and Scholars (OISS), located in Coxe Hall, immediately upon arrival on campus.

1.2 Required Orientations

We encourage all incoming graduate students to attend *all* sessions of the University New Student Graduate Orientation (which is held at the start of every academic semester). However, the following sessions **must be attended** in order to be in compliance with University regulations :

Effective Teaching
Presentation Skills
Classroom Management
Instructional Technology
Important Policies TA's Need to Know
Professionalism, Ethics and Integrity
Lab Safety Training, at both Orientation and in the department seminar
MAT Lab Safety Course, Right to Know
TOPSS Testing - a test of English proficiency (English as second language students)
*International Students and Scholars Orientation (International Students Only)

Failure to attend the above sessions will result in not being able to enter lab areas nor will you be permitted to serve as a departmental teaching assistant, which is a program requirement in the Department of Materials Science and Engineering. Registration must be done online through the Graduate Student Life site at: https://grad.lehigh.edu/

1.3 Diagnostic Testing

All incoming graduate students (both MS and Ph.D.) are required to take this placement exam. Its purpose is to determine, prior to selecting the first semester courses, the areas of MS&E in which a student may have deficiency. The exam is given at the Department's sophomore level, MAT 33 course: Engineering Materials and Processes. The diagnostic test can have two outcomes, as determined by the Chair of Graduate Committee in coordination with the student's adviser:

- Pass: The student may move on with graduate coursework starting with the Foundation courses.
- Pass w/ deficiency: The student must remove deficiency by taking one or more of the prescribed undergraduate courses before, or concurrently with, registering for the Foundation courses.

1.4 Course Selection and Registration

When a graduate student enters the department, particularly from a discipline other than materials science and engineering, the advisor will carefully review the student's performance in the diagnostic test and previous courses to determine whether there is sufficient background to begin the department's Foundation Courses or whether remedial courses are recommended. Students without a B.S. in materials science and engineering or an equivalent subject, may use up to 6 credits of 200-level MS&E courses to fulfill the total credit requirements. The GPA in such courses must be at least 2.75 and the courses must be approved by the Graduate Coordinator in Materials Science and Engineering prior to the student registering for the courses.

All new graduate students must register, in consultation with their advisors, for their course work during the registration period. Personal identification numbers (PINs) for registration will change every semester and can be obtained from either your adviser or the Graduate Coordinator. To maintain full-time status Graduate Students must register for nine credits a semester or be certified full-time by the Registrar's office via a Full-time certification form. Full-time certification forms can be found as a DocuSign Form online on the Registrar's Web page under Forms for Graduate Students.

Registration Deadlines
Current full-time students must pre-register each semester during the announced pre-registration period. **Registration deadlines are typically August 1st for the Fall semester and the first business day in January for the Spring semester.**

Failure to pre-register will cost you a personal "late fee" of $100 by the Registrar. First time students do not have to register within the pre-registration and will not be subject to the fine. This exemption only applies to your first semester as a full-time graduate student at Lehigh.

Materials Science and Engineering Graduate Programs (MS and Ph.D.) have three required core courses: (1) MAT 401 Thermodynamics (3 cr.), (2) MAT 403 Structure and Properties (4 cr.), and (3) MAT 405 Advanced Kinetics (3 cr.). The first course, MAT 401, covers advanced thermodynamics of materials. In addition to the assigned lecturers, several guest lecturers may be invited to present a wide range of topics. The second course, MAT 403, covers structure and properties of materials. The third course, MAT 405, covers advanced kinetics of materials.

By University rules, a student will not be allowed to continue as a graduate student if they accumulate more than four grades below B-. In addition, no credit is counted towards a degree for grades below C for 400-level courses and B- for 300-level courses.

International Students please adhere to the following guidelines when registering for online or courses through distance education:

The official NAFSA: Association of International Educators policy as reported by Lehigh's International Students and Scholars office is as follows:

The 8 C.F.R. § 214.2(f)(6)(i)(G)

(G) For F-1 students enrolled in classes for credit or classroom hours, no more than the equivalent of one class or three credits per session, term, semester, trimester, or quarter may be counted if taken online or through distance education in a course that does not require the student's physical attendance for classes, examination or other purposes integral to completion of the class. An online or distance education course is a course that is offered principally through the use of television, audio, or computer transmission including open broadcast, closed circuit, cable, microwave, or satellite, audio conferencing, or computer conferencing. If the F-1 student's course of study is in a language study program, no online or distance education classes may be considered to count toward classroom hours or credit.

Also - please note that when a student is in their last semester and only requires one course, it cannot be a distance ed course. Below taken from NAFSA Manual:

"The regulations are silent on the question of whether a distance education course can satisfy the full course of study requirement if it is the only course taken in the final semester of study. However, in the March 2008 SEVIS Liaison Call, SEVP told NAFSA:

If a student needs only one course to finish his or her program of study, it cannot be taken through online/distance education. There must be a physical presence requirement for the course. If a student remains in the United States without reporting to any class, it becomes a security issue and cannot be allowed."

1.5 Desk Assignments, Keys and Mailboxes

Desk assignments, keys, and departmental mailboxes must be obtained through the Graduate Coordinator in the Department of Materials Science and Engineering. In the semester you plan to leave Lehigh, you must contact the Graduate Coordinator for a Check Out form and leave enough time to get the pertinent signatures and return it to the Graduate Coordinator. Upon leaving, return your keys to the IDEAL Office so they can indicate the return as part of clearance for graduation.

1.6 Health Insurance

University policy requires ALL resident graduate students to have health insurance.
For 2024-2025, the annual premium for **student only** coverage is $2,509. To help eligible students (see criteria below) afford individual coverage, the University will provide a subsidy of $1,999.20 towards the $2,509 annual insurance premium for students receiving assistantships and fellowships through Lehigh's Payroll Office. The out-of-pocket cost for their individual coverage will be $499.80. Eligible students will receive a subsidy payment of $761.60 in Fall and $1,237.60 in the Spring, minus the appropriate taxes for each semester during which they qualify. The subsidy will be paid at the end of each semester (with December 27, 2024 and May

30, 2025 paychecks.) NOTE: If your paychecks stop before these dates, you will not be able to receive the subsidy.

The subsidy program is an integral part of the University's commitment to providing our graduate students with a quality insurance program. This insurance covers the graduate student only and not their dependents. For AY 2024-2025, to help afford the dependent coverage, the University will provide a subsidy of $250 per semester, ($500 per student/family per academic year) to the eligible graduate students with a dependent child and/or spouse; minus the appropriate taxes for each semester during which they qualify.

Criteria for Sickness/Injury Insurance Subsidy Program
The subsidy program is offered to students who meet all criteria listed below on the payment subsidy date:

1. The student must confirm their enrollment of insurance AND
2. The student must be a full-time or certified full-time graduate student AND
3. The student must be receiving assistantship or fellowship payments through the university payroll system AND
4. The student has paid health insurance premium in full by the time the subsidy is paid out or has signed up for payroll deduction of premiums.

To enroll in the insurance program, the student must confirm your enrollment in the health insurance by going to www.universityhealthplans.com AND submit payment to the Bursar's Office. Students must complete their registration prior to being eligible to confirm their enrollment in the health insurance plan.

Please contact the Office of Graduate Student Life at (610) 758-3648 or ingrador@lehigh.edu or see the Graduate Student Health Insurance and Health Insurance Subsidy policy webpage for more information regarding this program and the eligibility requirements.

1.7 Safety Requirements

All incoming students must attend a Departmental Safety Seminar, must view the Environmental health and Safety (EHS) online lab safety trainings distributed by the MSE Department, and are also required to attend the University Orientation sessions held at the start of the term when beginning your program.

It is an annual requirement for all graduate students to attend the mandatory lab safety seminar and take any accompanying MAT Lab Safety quiz.

If a student does not participate in the Safety Training seminar, complete the training videos, and/or fail any accompanying MAT Lab Safety Quiz, it may be necessary to have a physical meeting with the EHS Office to go over deficiencies. Failure to pass the MAT Lab Safety Course may result in termination of graduate work in the Department.

Compliance with all safety regulations of the University and of specific laboratories is absolutely required of every student. Non-compliance could lead to expulsion from laboratory facilities. Handbooks on laboratory procedures, waste disposal, hazardous material, etc., are handed out at orientation. Each student is responsible for safety in the laboratory and should report all unsafe

practices to his/her advisor, the laboratory Safety Officer listed outside the laboratory door, and the Department Chair.

Eye Protection: The State of Pennsylvania requires that eye protection be worn in every laboratory. Safety glasses are required in every laboratory and side shields may be required in certain labs where chemicals are in use. Check the specific lab requirements.

English Speaking: All students **MUST Speak English** in the laboratory environment for safety reasons. Any student violating this requirement will be given a warning and a notice will be sent to their advisor. A second offense may result in expulsion from the laboratory and a meeting among the Safety Officer, student, and laboratory supervisor will be held to correct the problem.

1.8 Seminars

There are two types of seminars in the MSE Department: Graduate Student Seminars and MSE Department Seminars. The descriptions and participation requirements for these seminars are as follows:

Graduate Student Seminar Requirement

An essential part of graduate education is to effectively communicate the methods and results of new research. For this reason, all PhD students and MS students completing a thesis project are required to present an overview of their current research in the form of a Graduate Student Seminar. PhD students are expected to present two seminars and MS students completing a thesis project present one seminar during their program of study.

> Graduate Seminar Presentations
>
> Each seminar presentation should be approximately 15 – 30 minutes in duration. The level should be appropriate for a diverse audience of graduate students and faculty. It is not necessary to present fully completed work; the intention is to clearly describe to the audience the project plan, the techniques used, and any conclusions that have been reached at the time of the presentation. This will foster open discussion that can aid all students in generating new ideas as well as in dealing with obstacles in their research.

Each semester, two MSE graduate students act as coordinators of the Graduate Student Seminars.

MSE Department Seminars

Another essential part of graduate education is to become aware of advances in areas of research outside of one's specialty. To facilitate this, the MSE Department holds seminars generally led by external faculty and industry professionals during the Fall and Spring semesters.

MSE Seminar Registration Requirement

The MSE Department offers a one-credit Materials Science and Engineering Seminar course that all full-time MSE graduate students (who matriculated in Fall 2023 onwards) are expected to enroll in during their program of study.

MS students should register for the MSE Seminar course two times during their program of study, equalling two total credits, while PhD students should register for the course four times

during their program of study, equalling four total credits. The details of this course are outlined below.

Materials Science and Engineering Seminar Course

The Materials Science and Engineering Seminar course is a one-credit course that will be offered during the Fall and Spring semesters. This is a Pass/Fail course based on attendance of the MSE Seminar events, which will be held once a week throughout the semester. Students who attend 80% or more of seminars will be assigned a passing grade in the Materials Science and Engineering Seminar course. There will be an Attendance Sheet available to sign in at each seminar. If a student fails the course, they must retake it in a subsequent semester.

Attendance Requirement for MSE Seminar Events

Please note that all full-time MSE graduate students are expected to attend all department seminar events, regardless of whether they are enrolled in the Materials Science and Engineering Seminar course.

An overall rate of 80% attendance each semester of full-time registration must be demonstrated in order to receive a graduate degree. If it is not possible to attend 80% of the seminars offered within the Materials Science and Engineering department, a student may attend seminars offered by other departments. Students should ask the person taking attendance to notify the MSE Graduate Coordinator that you have attended the seminar.

On the occasion that a student is unable to attend part or all of the semester seminar series, they should discuss this with the Graduate Coordinator. A standard Graduate Student Petition form may be required to be completed, signed off by your advisor, and submitted to the Graduate Coordinator in Material Science and Engineering for the attendance waiver to be allowed.

1.9 Graduate Student Representative to MSE Faculty Meetings

In an effort to quickly address graduate student concerns and to obtain a graduate student perspective on departmental issues, two graduate student representatives are appointed to attend the monthly MSE Faculty meetings. Each Graduate Student Representative will serve up to a two-year term upon appointment by the MSE Graduate Student Coordinator. Generally, terms will begin in the Fall semester of a given academic year and cannot be extended beyond a total of one term (two years). To ensure a diversity of perspectives, ideally one graduate student should be appointed from the available pool of domestic graduate students and another from the available pool of international graduate students. The two representatives need to coordinate who will be attending. Important information from the monthly MSE Faculty meetings should be relayed to MSE graduate students as deemed necessary by the Graduate Student Representatives.

1.10 Department Representative to Graduate Student Senate

Every year, one graduate student and one alternate is appointed to serve as the MSE Unit Representatives to the Lehigh University Graduate Student Senate. The one-year appointment, beginning in the Fall semester of a given academic year, is overseen by the MSE Graduate Student Coordinator and may be extended for one extra term (for a total of two years). Due to the close relationship between the MSE and PSE (Polymer Science & Engineering) programs, the unit representative may represent both MSE and PSE programs. Important information from

the biweekly Lehigh University Graduate Student Senate meetings should be relayed to the MSE Graduate Coordinator, MSE Faculty and the MSE/PSE graduate students as deemed necessary by the MSE/PSE Unit Representatives.

1.11 Graduate Student Service to the Department

Throughout the year there are many events in which a graduate student can provide service and assistance to the department. These events include but are not limited to: Family Weekend, Engr 5 Tours, Candidates Day Tours, Open Houses, Materials and Teachers Camps, Nano Days, Governor's School, and ad hoc tours of our facilities.

Each student is expected to participate in at least five (5) hours of department service a year. These opportunities not only play an important part in the success of these events, but also afford the student many opportunities to interact with Faculty, Staff, other students, prospective new students, and external visitors. It also plays an integral part in Professional Development, as it entails learning to interrelate with the community at large, and can be used to enhance your resume.

2.0 MS ACADEMIC REQUIREMENTS

2.1 MS Course Requirements:

The Master of Science (MS) degree requires a minimum of 30 credits.

Program Timeline: Normal full-time duration for an MS degree is 1.5 to 2 years; however, all work must be completed within a maximum of 6 years.

A note regarding grades: Please note that no credit is given for grades below a C-. A student will be ineligible for a Master's Degree if the student accumulates more than four grades below B-. A GPA of at least 2.75 is required to qualify for the Master's degree.

Additional Program Requirements: Students enrolled in the MS program must also 1) complete all safety training prior to entering laboratories, 2) complete annual department safety quizzes, 3) attend MSE department seminars (see section 1.8), and 4) all students completing a thesis project present their research at a MSE Graduate Student Seminar one time during their MS program.

MS Program Options: There are three options for a student enrolled in the MS degree program: 1) Thesis Project, 2) Engineering Project, and 3) Coursework-Only Option. These three options are outlined below:

Option 1: Thesis Project

Should an MS student elect to complete a thesis project during their MS in MSE degree program, they must complete the program's three core courses (i.e., MAT 401, 403, and 405) and identify a research advisor, who would provide academic guidance in conducting the thesis project and provide additional support for the student's overall professional development.

The MS thesis normally represents six (6) of the 30 semester hours required for this degree. Students completing a thesis must complete three (3) credits of MAT 490. Students should enroll in MAT 490 (Thesis) when completing their thesis project. Students may enroll in MAT 490 more than once. MAT 490 is a course with variable credits, meaning that it can count for one (1) to six (6) credits in a given semester.

If a MS student has completed all course and credit requirements for the degree but is finishing up their thesis project, they should register for 1 credit of ENGR 490 Thesis in order to maintain their candidacy for the degree. They also need to submit a Full Time Certification Form.

Credits from thesis projects count towards 'Coursework Requirement 2' in the MS Program Chart shown below in section 2.2.

Option 2: Engineering Project

Should an MS student elect to complete an engineering project during their MS in MSE degree program, they must complete the program's three core courses (i.e., MAT 401, 403, and 405) and enroll in MAT 460 (Engineering Project). Students should contact the instructor of the course prior to registering and discuss their goals and engineering project options. The MAT 460 course involves an in-depth study of a problem in the area of materials engineering or design. The study will lead to specific conclusions and be embodied in a comprehensive written report and presentation.

The MS engineering project generally represents three (3) to six (6) of the 30 semester hours required for the degree. Students should enroll in MAT 460 (Engineering Project) when completing their project. Students may enroll in MAT 460 more than once. MAT 460 is a course with variable credits, meaning that it can count for one (1) to six (6) credits in a given semester.

Credits from thesis projects count towards 'Coursework Requirement 2' in the MS Program Chart shown below in section 2.2.

Option 3: Coursework-Only Option

Should an MS student elect to pursue the coursework-only option during their MS in MSE degree program, they must complete the program's three core courses (i.e., MAT 401, 403, and 405) and twenty (20) additional credits of coursework as follows:

- 8 credits of MSE coursework (5 credits must be at 400-level, and 3 credits can be at 300-level)
- 12 credits of elective coursework (can be in MSE or outside of the department, subject to approval of your advisor)

The eight (8) credits of MSE coursework described above count towards 'Coursework Requirement 2' in the MS Program Chart shown in section 2.2, and the twelve (12) credits of elective coursework described above count towards 'Coursework Requirement 3'.

2.2 MS Course Requirements Chart:

Courses	Credits
Coursework Requirement 1: Three Core Courses	
MAT 401: Thermodynamics **Required Core Course**	3 credits
MAT 403: Structure/Property Relations **Required Core Course**	4 credits
MAT 405: Advanced Kinetics **Required Core Course**	3 credits
Coursework Requirement 2: Additional MSE Coursework	
Additional coursework in Materials Science and Engineering: This includes the coursework related to the Materials Science and Engineering Seminar, Thesis project (MAT 490), Engineering project (MAT 460), or Coursework-Only options, as appropriate.	8 credits (5 of these credits must be 400-level MAT courses, and 3 credits can be 300-level MAT courses)
Coursework Requirement 3: Elective Coursework	
Free elective coursework in MSE or outside the MSE department upon approval of your advisor	12 credits (can be either 300-level or 400-level coursework), subject to approval by the student's advisor

2.3 Graduation Requirements for MS Program:

In the last semester students need to complete the following:

- Make sure you have satisfied all of the seminar requirements outlined in section 1.8
- Submit the following paperwork to the Graduate Coordinator in the Materials Science and Engineering Department or online when specified:

Forms	Due Date	Special Notes
Application for Degree - online in your Banner account	January Graduation: 10/1, May Graduation 2/27, September Graduation 7/1	
Master's program form	By the beginning of the last term. This can be submitted as early as 15 credits. It MUST be processed before the last term ends.	
Submission of Thesis Electronically: http://www.etdadmin.com/lehigh	Must be done by designated deadlines set by the Registrar's Office	MS students completing Thesis only
Original signature sheet signed by ALL committee members	Must be done by designated deadlines set by the Registrar's Office	MS Students only, turn directly into the Registrar's Office
Microfilming receipt from the Bursar's Office	Must be done by designated deadlines set by the Registrar's office	MS Students only, turn directly into the Registrar's Office
Seminars	All seminar requirements must be completed as outlined in section 1.8 of this handbook	MS full-time students only
Graduate Student Check-Out Form	Submission required before leaving Lehigh. * Allow a minimum of FIVE (5) DAYS PRIOR TO LEAVING for Environmental Health and Safety to secure clearance and sign off on the form.	All Students: MS and PhD The Completed form must be submitted to the Graduate Coordinator in Materials Science and Engineering.

*** See Thesis and Dissertation guidelines at the bottom of this web page:**
https://engineering.lehigh.edu/doctor-philosophy-degree-requirements

3.0 DOCTORAL ACADEMIC REQUIREMENTS

3.1 Ph.D. Course Requirements:

- Students must complete 72 credit hours beyond their B.S. degree or 48 credits if they come with a M.S. degree in a relevant field from another recognized institute.

- Three University 400-level courses must be taken in addition to the 3 required Core Courses (MAT 401, 403, and 405).

  Please note that the MAT 496: MSE Seminar class and MAT 499: Dissertation do not count towards this 400-level course requirement. The MAT 496: MSE Seminar class and the MAT 499: Dissertation course will count towards a PhD student's program credits, but they cannot count as one of the three additional 400-level courses in the above-stated requirement.

- Students are expected to take additional courses beyond these minimum requirements. The specific course work is to be determined by their Adviser and their Ph.D. Committee and should reflect both breadth and depth.

  Course Requirement Waiver Process
  If a PhD student has completed a course at another educational institution that is equivalent to one of the MSE required Core Courses (MAT 401, 403, and 405), the student may submit a **Petition Form** to the MSE Graduate Committee to request a course requirement waiver.

  The student will be asked to provide a syllabus from the equivalent course and the request will be shared with the appropriate MSE faculty member(s) who are the Instructors of the required course for their review. If a course requirement waiver is granted, the student will not be required to register for the required course.

3.2 TA Requirement

Each Ph.D. candidate must serve as a Teaching Assistant in a technical course within the department. This includes any technical course taught by a faculty member in the Materials Science & Engineering Department. This is a Departmental requirement for graduation. A student for whom English is not their first language needs to score greater than (>) 3.5 on the TOPSS test in order to be a TA (see **English Language Proficiency** below). Teaching Assistantships (TAs) are assigned by the MSE Graduate Committee.

- Each Ph.D student is required to perform a total of one (1) full Teaching Assistantship (TA) or the equivalent of 20 hours for one (1) full semester.
- One (1) full TA is equivalent to 20 hours of work per week per semester. Note that many TA assignments are half (0.5) TA, which is the equivalent of 10 hours per week per semester. In this case, the student would hold a half (0.5) TA position a minimum of 2 times.
- The maximum number of TA assignments a student may complete shall not exceed 2 full TAs (unless approved by the MSE Graduate Committee).

- One (1) full TA must be completed in the MSE Department by the end of the third year of starting the program or before graduation, whichever occurs sooner, unless an exception is provided by the MSE Graduate Committee.
- Students may petition the department using a standard Graduate Student Petition Form (for department use only) if there are special needs/circumstances or situations preventing a student from being able to follow the requirements detailed above. Students can submit the petition to the Graduate Coordinator.

English Language Proficiency

A score of 3.5 or higher on the TOPPS test is a graduation requirement of this department that applies to students for whom English is their second language. Information on the TOPPS test can be found on the TOPSS program website. If the student receives a score below 3.5, then the student must continue with English as a Second Language (ESL) courses and/or seek tutoring (to be determined by the International Center for Academic and Professional English - ICAPE Office) until a passing score (≥ 3.5) is obtained. Failure to pass the TOPSS test (score ≥ 3.5) within the two-year time limit may result in denial of degree, loss of support and/or ineligibility for funding. The Department will cover the TOPPS testing fee for the first try (must be taken by the end of the first semester on campus). Graduate students with scores below 3.5 must personally pay for all re-examinations, ESL courses and tutoring until a score of ≥3.5 is obtained.

* Students with a TOEFL score over 84 are not required to take the TOPSS test, as long as the individual section scores are met. Depending on the individual scores, the International Center for Academic and Professional English (ICAPE) would dictate which ESL classes or remediations should be put in place.

3.3 Qualifying Exam Procedure

The MSE Qualifying Exam comprises both written and oral components and is usually taken after the first year of graduate study. Students are encouraged to take the qualifying exam as soon as they finish the required MSE Core Courses (i.e., MAT 401, MAT 403, and MAT 405) with a GPA of at least 3.0. Students will have three weeks to complete the written paper and an oral examination will follow one to two weeks after the paper is submitted. The qualifying exams are held twice a year, in August and January.

The Qualifying Exam will consist of two parts.

Part 1. (written)

The written exam or "white paper" is a 5 page document based on a proposed research topic that a student chooses in consultation with their adviser. In practice, the student's adviser will select at least three such topics and submit the choices to the Graduate Committee for approval. The topics can be related to one's research thrust, but may not be identical to the thesis topic.

The Committee will select one topic, and the student will then have three weeks to prepare a "white paper" based on the topic. More specifically, please note that an effective white paper is relatively short, states the relevance of the proposed research and its aims, provides a concise introduction to the research area that puts the project in context, describes how the research will

be done (including equipment usage) and contains a bibliography listing important references. The white paper should be written as if it is to be submitted to a governmental agency with the goal of persuading that agency to fund the research based on its merits. No budget is required for this document.

The qualifying exam is intended to adhere to traditional proposal writing guidelines. As such, guidance on appropriate font, spacing, margins and formatting can be taken from funding agencies, e.g., NSF: https://www.nsf.gov/pubs/policydocs/pappg20_1/pappg_2.jsp (Section B.2 and B.3). The white paper is a 5 page document (excluding references, yet including figures and tables).

Part II. (oral)

Part II of the Qualifying Exam will be an oral exam. The oral exam follows one to two weeks after the written exam and tests both the materials in the white paper and the student's grasp of the concepts at the foundation of materials science and engineering. This exam should not be taken lightly. Students need to be sufficiently prepared for this examination. **During this exam, the student will make a short (approximately 15 minute) presentation of the topic covered in the white paper.** The exam committee will then question the student on the content of the white paper and on the subject matter that constitutes the core of the materials curriculum (e.g. thermodynamics, kinetics, structure and properties of materials). At the conclusion of the written and oral exams, an evaluation of the student's performance will be given in the form of a letter grade.

Grading of the Qualifying Exam

To determine whether a student will become a Ph.D. candidate, the department as a whole will consider the student's grades in core graduate courses, their performance on the qualifying exam and their progress in directed research. This final assessment will be given as either "PASS" or "FAIL" and communicated directly to the student. In the event of a "FAIL", the student will be informed of any deficiencies and given a recommended course of action. In some cases a provisional "PASS" may be assigned with passing contingent on some remedial action. For PhD Qualifying Exams involving provisional passes, it is recommended to finish the exam process within 14 days. The Graduate Coordinator should be notified immediately for tracking purposes.

A student may attempt the qualifying exam no more than twice. Students need to complete and submit the report on the Ph.D. Qualifying Exam form to the Graduate Coordinator in Materials Science and Engineering.

Seeking input/review on the research portion of the qualifying exam

The qualifying exam is meant to assess the student's ability to comprehend and explain concepts related to material science along with the ability to independently investigate and propose promising research opportunities for an assigned topic. The research topic investigation should be pursued as an individual, though talking with peers is acceptable and encouraged. Discussion or review of a draft proposal or presentation with any faculty member (within or outside of the department) is not permitted beyond an initial discussion with the student's advisor to provide clarity on the scope of the assigned topic. Lehigh's Graduate Education & Life offers writing

support and students are ***strongly*** encouraged to take advantage of these offerings: https://grad.lehigh.edu/graduate-writers-studio.

3.4 Doctoral Committee

The doctoral committee is a special committee formed to guide the student through the doctoral program. The committee is responsible for assisting the student in formulating a course of study, satisfying specific departmental requirements, submitting a suitable dissertation proposal, overseeing progress in research, and evaluating the completed dissertation.

In regards to the other members of the doctoral committee, the requirements are as follows. Once as student has identified their Doctoral Committee members, they should email the College of Engineering's Graduate Programs Manager for approval of their committee:

1) There must be a minimum of four members
2) Three must be Lehigh University voting faculty (including the committee Chair)
3) One must be external to the home department

The doctoral committee should contain a minimum of four committee members. Of these, three, including the committee chair, are to be voting Lehigh faculty members. With the written approval of the dean of the college, one of the three aforementioned faculty members, each of whom must have a doctoral degree, may be drawn from categories that include departmentally approved adjunct, professors of practice/term faculty, and courtesy faculty appointees. These latter members may not serve as the committee chair. The fourth required member must be from outside the student's department or outside the student's program if there is only one department in the college). Committees may include additional members who possess the requisite expertise and experience. This committee must be formed and must meet within a year after passing the PhD Qualifier Exam.

Committee members must be approved by the University's Graduate and Research Committee; such approval may be delegated to the department or program sponsoring the degree.

3.5 Annual Review

The doctoral committee will meet annually to review the graduate student's progress towards completion of their Ph.D. Dissertation.

3.6 Dissertation Proposal/General Examination

Once a student's Doctoral Committee is approved by the Dean's Office, they can develop and submit their Dissertation research proposal to that committee. **A dissertation proposal involves two steps: 1) submitting your written research proposal, and 2) an oral examination (i.e., defending your dissertation proposal to your Doctoral Committee).**

The purpose of the dissertation proposal/general examination is to outline the research that will fulfill the requirements for the Ph.D. dissertation. This process involves developing a written research proposal, which should be submitted to the committee, and preparing a 30-45 minute

presentation of that information. You will also need to submit a coursework summary (see below for details) with the research proposal.

In addition to submitting the written proposal, you will need to coordinate with your Committee to schedule your Oral Exam, which is a Dissertation Proposal Defense. Your written research proposal must be submitted to your Committee at least one week before your Dissertation Defense date. This oral exam will involve yourself and your Doctoral Committee, and generally takes 2-3 hours.

Written Dissertation Proposal. The written proposal should follow NSF's guidelines for a Single Investigator Proposal. The proposal should contain at least the following: (1) review of the pertinent literature, (2) preliminary research conducted on the topic, (3) detailed outline of the proposed investigation. *Document length is limited to 15 pages single line spacing.* The presentation should be 30-45 minutes long and you should allow 2-3 hours for your proposal.

Coursework Summary. The student should list the following information with the dissertation proposal: (a) degrees earned including the names of schools and departments and the dates awarded, (b) all Lehigh courses completed showing course titles, credit hours, and grades, (c) date of passing the Qualifying Examination, and (d) additional course work proposed.

The written dissertation proposal and coursework summary are to be submitted to the prospective student's Doctoral Dissertation Committee no later than **one week** prior to the date of the dissertation proposal defense.

Oral Examination. The student will defend their dissertation proposal before the doctoral committee. The discussion may expand to cover the wider range of the specialty area related to the student's research. Questions during the proposal may be from any area of MSE, but will be in greater depth in the Specialty Area in order to certify the technical qualifications of the student.

If the student fails the proposal, the student may be permitted to propose one additional time no earlier than three months or later than six months after the first proposal. If the results of the second proposal are also unsatisfactory, no further examination will be given, and the candidate will not be permitted to continue towards the Ph.D. Since the Proposal Defense is synonymous with the General Exam in the MSE department, after the proposal is completed the student will need to complete and submit the Report on General Doctoral Exam form to the Graduate Coordinator in Materials Science and Engineering.

Once a student successfully 1) forms their doctoral committee, 2) submits their research proposal to that committee, and 3) defends their dissertation proposal, they can then apply for Doctoral Candidacy.

3.7 Admission to Candidacy

Once a student has passed the proposal/general exam process, they should complete an Application to Candidacy. This form can be found on the MSE Graduate Student Resources webpage.

The Admission to Candidacy paperwork must be received two weeks prior to the start of the Fall or Spring terms to be able to drop down to one credit if you have met the credit requirement (i.e., 72 credit hours needed if the student entered the program post-Bachelors and 48 credit hours if

the student entered post-Masters). Please make sure the following is submitted to the Graduate Coordinator in the Materials Science and Engineering department:

a. Application for Admission to Doctoral Candidacy form.
b. Electronic copy of the written dissertation research proposal
c. Research Proposal Approval completed via DocuSign. (Please list each member of your committee, and they will each get a notification to sign off electronically.)
d. General Exam Signature Sheet completed via DocuSign. (Please list each member of your committee, and they will each get a notification to sign off electronically.)

These forms can also be found on the college current student website at https://engineering.lehigh.edu/academics/graduate/student-resources.

Upon receipt of the items listed above the Graduate Coordinator in Materials Science and Engineering will submit everything to the Dean's Office in the College of Engineering and Applied Sciences for approval. Notification of Admission to Doctoral Candidacy will come from the office of the Dean of the College of Engineering and Applied Science.

Upon successful completion of the general exam and the student successfully advanced as a doctoral candidate, a 3% increase in their stipend will be provided in the following semester.

3.8 Dissertation and Defense

Completion of the Doctoral Dissertation shall be scheduled to comply with the following requirements:

a. ***Dissertation:*** This document shall be prepared according to the instructions of the Graduate School and must have the format given in "Guidelines for the Preparation of Master's Thesis and Doctoral Dissertation". These guidelines can be found on the Lehigh University website. Additional information can be found on the Degree Completion webpage.

b. ***Rough Draft:*** To satisfy graduation requirements, a draft of the dissertation, bearing the signature of the dissertation advisor, must be presented to the office of the Dean of the College of Engineering and Applied Science before the submittal deadline given in the academic calendar.

c. ***Defense:*** After the draft of the dissertation has been approved by the Dean's Office, the candidate distributes copies of the draft dissertation to the members of the Doctoral Committee. The candidate then arranges a suitable date and location for the defense of the dissertation, allowing time for the Doctoral Committee to examine the draft. The date of the defense shall be posted on the departmental bulletin boards by the candidate. *At least two weeks prior to the defense, a copy of the dissertation shall be placed in the department office for examination.* The presentation portion of the dissertation defense is open to the public.

d. ***Required Final Copies:*** *After the defense, but no later than two weeks before the degree is to be conferred, the candidate should send to the Dean's Office Manager of Graduate Programs* ***one copy of the dissertation*** including one title page showing original signatures of approval by the Doctoral Committee. Submission of the final dissertation

must be done online at http://www.etdadmin.com/lehigh and must be done in accordance with the set deadlines by the University.

Please see the table below for deadlines and requirements.

1.	Concentrated Learning requirement: either two semesters of consecutive full-time graduate study (9 credits per semester, spring and fall) or 18 credit hours of graduate study within a fifteen-month period must be completed. Individual departments may impose additional requirements. Candidates should check with their advisors to be certain that they have satisfied their residency requirements.
2.	Admission to candidacy: A. Qualifying Exam B. approval of composition of doctoral committee (at least 4 members, with one being from outside the department or program). C. application for candidacy signed by members of doctoral committee. one original copy of the proposal
3.	TOPSS Test passed (International Students Only). > 3.5 required
4.	Dissertation proposal must have been passed 7 months prior to graduation.
5.	Payment and completion of minimum tuition fee equivalent to 72 credit hours beyond the Baccalaureate or 48 credit hours beyond the Master's degree (obtained from another university or in a different field at Lehigh).
6.	Application for degree. Apply on or before date specified in catalog (February 28th for May degree, July 1st for September degree or October 1st for January degree) at the Registrar's Office. Re-application is required if student misses the expected graduation date.
7.	Dissertation first draft must be signed by the advisor and another committee member. Submit to the Office of Graduate Studies & Research by the relevant deadline. Refer to the University calendar for the exact date.
8.	Final dissertation defense examination. Notify the Office of Graduate Studies & Research of this date in advance. You may do this by submitting a copy of your defense announcement. The Materials Science and Engineering Graduate Coordinator must be notified at least one week prior to the scheduled defense.
9.	Submission of final dissertation using the online submission system. Submission of Bursar's receipt for the fee, and other relevant paperwork to the Office of Graduate Studies & Research. Check final submission date in the University calendar.
10.	Interdepartmental clearance form is secured through the Office of Graduate Studies & Research or the Registrar's Office, and returned to the Registrar's Office after obtaining the appropriate signatures. Also, check with the Bursar's Office, Bookstore, Library and Parking Services for any outstanding balances. Be sure to clear any balances due to the university to ensure receipt of your diploma at graduation. Check out forms must be submitted to the Graduate Coordinator in the Materials Science and Engineering Department.
11.	Make sure all of the seminar requirements have been completed as outlined in section 1.8 of this handbook. If you have any questions regarding attendance and requirements, contact the Graduate Coordinator.

3.9 Draft of Publishable Paper/Residency Requirements/Time Limits

A draft of an article for publication, based on the dissertation, shall be submitted to and accepted by the advisor prior to approval of the dissertation by the Doctoral Committee. A candidate for the doctor of philosophy degree ordinarily is expected to devote at least three academic years to graduate work. In no case is the degree awarded to someone who has spent less than two full academic years of graduate work. All post-baccalaureate work toward the doctorate must be completed within ten years. A student beginning doctoral coursework after an elapsed period of at least one semester after the master's degree has been conferred is granted seven years in which to complete the doctoral program.

4.0 SPECIAL DEPARTMENTAL REGULATIONS

4.1 Grievance Procedures

If a student has a complaint about a faculty member, course, or other departmental matter for which redress has not been obtained, the complaint should be brought to the attention of the MSE Graduate Committee. Please contact the MSE Graduate Coordinator or the Graduate Committee at mse-grad-committee-list@lehigh.edu. A written response will be given to the student. If the student is not satisfied, a petition then goes to a select committee of the faculty for decision.

4.2 Petition Process

The right of petition is open to all students at all times. The Graduate Student Petition form must be prepared completely and signed by the student's advisor, department faculty graduate coordinator, department chairperson, and associate dean of graduate studies. The form is then submitted to the Registrar for final action. Following is a **partial** list of situations that require approval through a graduate petition:

- Change of status from an associate (or non-degree) to a regular graduate student
- Readmission as a graduate student following an absence of 1 year or more
- Removal of an incomplete (N) grade after one calendar year has elapsed
- Changing members of the doctoral committee

A petition is a request for a change or exception to be made to University policy and procedure, and therefore is evaluated on an individual basis. Unless it's a petition which requires a departmental decision, once a student gives the petition to the Graduate Coordinator, departmental signatures must be obtained, the petition is sent to Dean's Office for review and approval, and finally sent to the Registrar's Office to be reviewed and decided upon during a SOGS Meeting. The Standing Order of Graduate Students (SOGS) meetings are held bi-monthly during the academic year (less in summer) generally on a Tuesday. The completed and signed petition must be in the Registrar's Office no later than 4 pm on the Thursday before the Tuesday meeting. Please be aware of this timeline and submit any petition as early as possible.

4.3 Transfer Credit Policy

A maximum of up to nine credits taken at the graduate level elsewhere may be transferred from an accredited graduate college or graduate university to a Lehigh University Engineering Master's Program.

All courses must be assigned a grade of "B" or better to be eligible, and have not been used toward any prior degree. The credits must be completed within four years of first enrollment into a Lehigh graduate program. A transfer credit approval form must be submitted to the Registrar along with course descriptions, an official transcript, and the recommendation of the departmental chairperson.

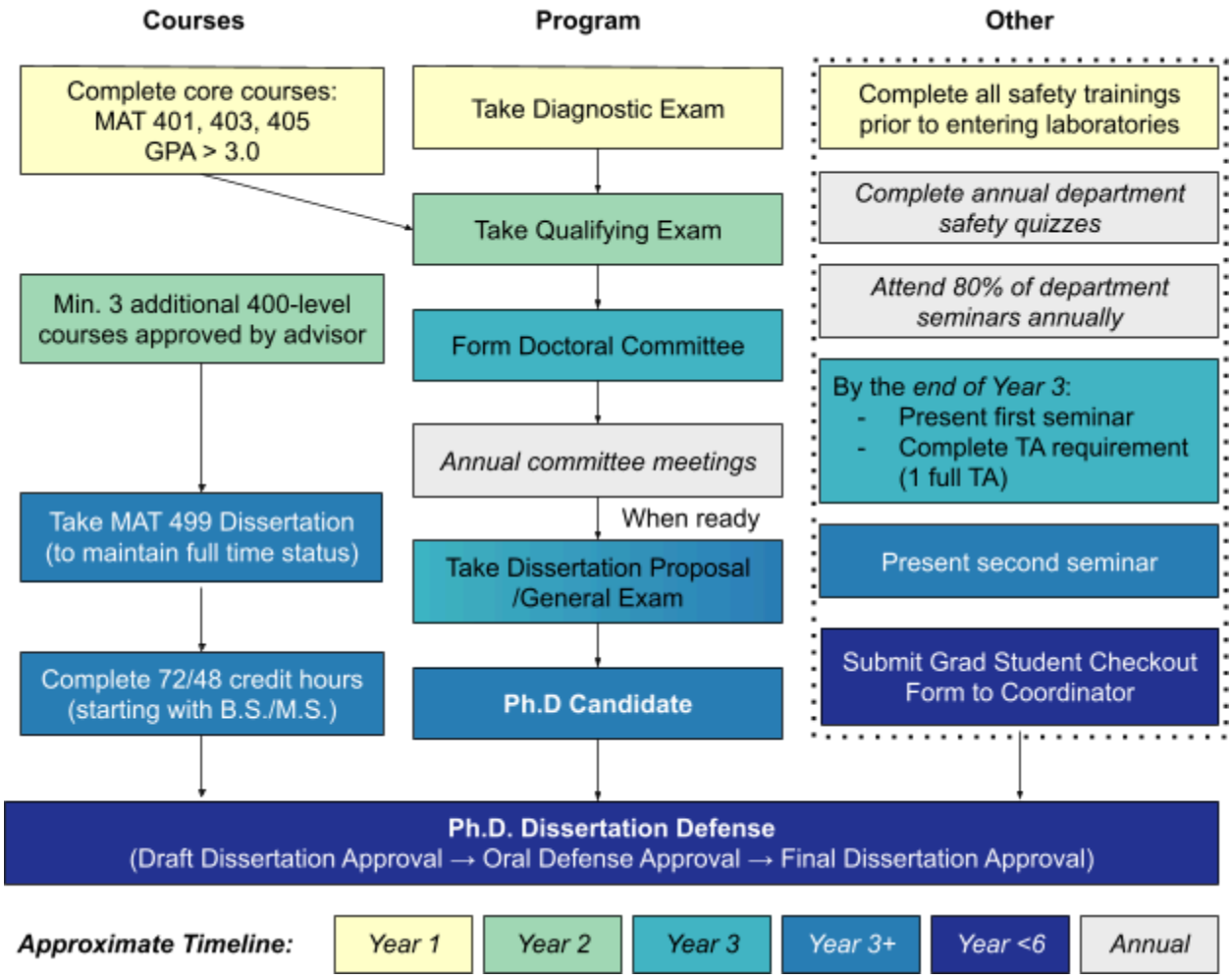
Guidelines associated with transferring credits are listed on the Transfer Credit form. For more information on transfer credit policies, such as transfer credit policy pertaining to those students

who are undergraduates of Lehigh University, please see
https://ras.lehigh.edu/content/current-students/transfer-credit-policy

4.4 Telephones

Telephones are available in most laboratories and offices for academic, business, and are primarily for safety use. Local personal calls are permitted provided they do not interfere with business use. Long distance calls for business purposes can be completed only with the use of an appropriate research account (4) digit code number, which may be obtained from the student's Advisor. Since most people have mobile phones, the office and lab phones are barely used. However, if the phone rings, please answer it, as it is likely a call from within the building.

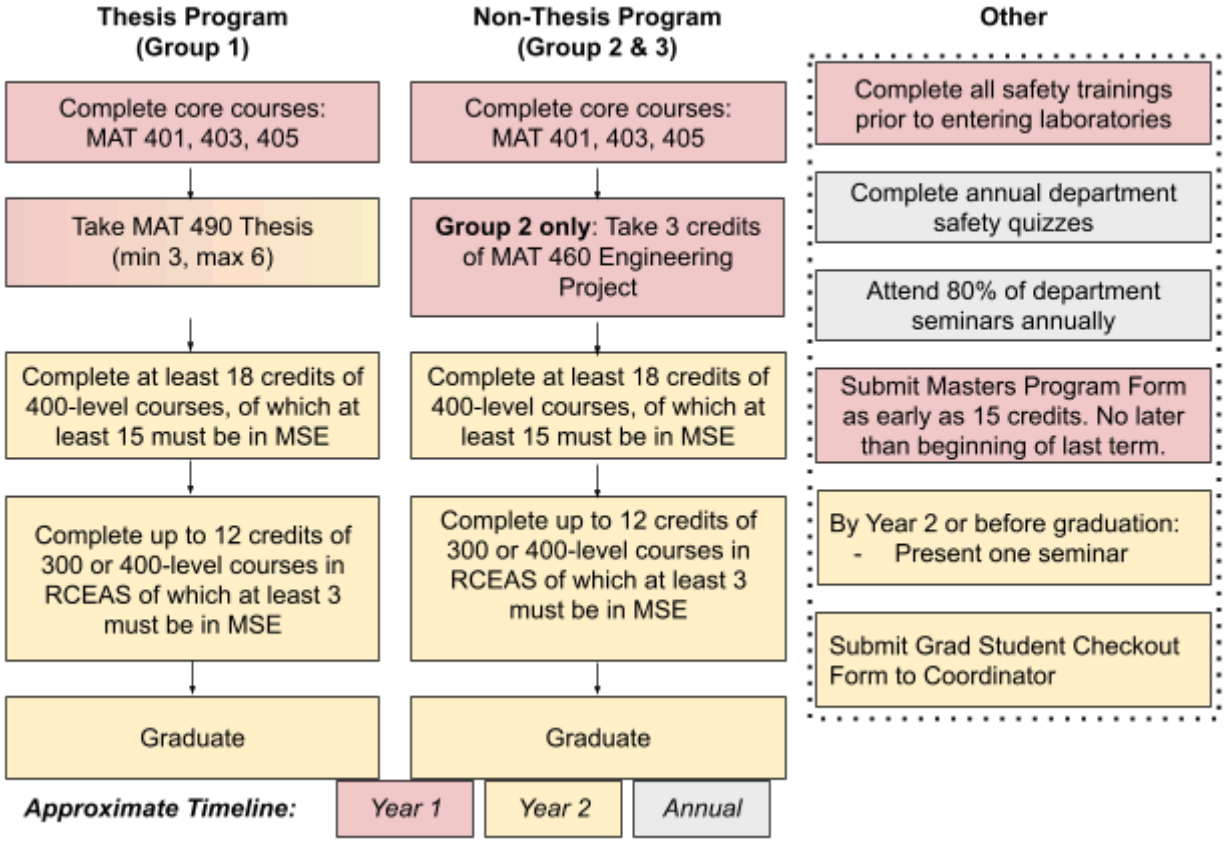
DOCTORAL FLOWCHART



A note regarding PhD program timeline: Please note that the Application for Doctoral Candidacy must be submitted at least 12 months before a degree is expected. The Dissertation proposal must have been passed at least 7 months prior to graduation.

* This flowchart is intended to be used as a guide for PhD students. Please refer to specific sections within the graduate student handbook for more details.

MASTERS FLOWCHART



* This flowchart is intended to be used as a guide for Masters students. Please refer to specific sections within the graduate student handbook for more details.