Abbreviated Overview of Requirements for the PhD Degree and Critical Timelines for Full-Time Students

1. Complete five core courses with a minimum gpa of 3.35/4.0 within the first three semesters of graduate study. Student must use the first five core courses taken for the gpa calculation. Core courses may not be retaken.

   *This requirement represents the first stage of candidacy at the Department level*

2. Form the PhD Committee (required for administration of General Examination).

3. Take the General Examination no later than the end of the second semester after the minimum core course gpa is attained; this is a Department requirement. The University requirement: the examination is held no later than seven months prior to the time when the candidate plans to receive the degree.

   *This requirement represents the second stage of candidacy at the Department level.*

4. Write the proposal for the PhD program. (Includes proposed research and course plan.)

5. Present the PhD proposal to the PhD Committee *no later than the end of the semester following the semester in which the General Exam was passed.*

6. File for PhD candidacy at the College level. (After the proposal is approved by the PhD Committee, submit the original General Exam Signature page, the original Proposal signature page, a copy of the proposal, and a completed Application to Candidacy form to Ms. Brie Lisk, 314A Packard Lab.) Approval of the proposal by the Associate Dean admits the student to candidacy for the PhD in the P. C. Rossin College of Engineering and Applied Science.

7. Present the dissertation research. A dissertation defense announcement is sent to all faculty and graduate students at least one week prior to the defense presentation.

**Identification of a PhD Adviser**

Students who would like to pursue a PhD degree must first identify a faculty member who is willing to provide supervision and funding (if needed) for the duration of the PhD program. Please be advised that our faculty have many commitments, and their availability for research supervision depends on the specialty within the area of mechanical engineering and the ongoing advisory commitments of each faculty member. When a faculty member has been identified, an Advisor Selection form is completed and submitted to the Mechanical Engineering and Mechanics Graduate Office.

* Each degree candidate is responsible for ensuring that his/her program is compatible with the degree requirements given in the most recent version of the Lehigh University Catalog and the Graduate Student Handbook of the P. C. Rossin College of Engineering and Applied Science: (http://www.lehigh.edu/engineering/pdf/graduate_student_handbook.pdf).
**Completion of Core Course Requirements**

The first stage of qualification for pursuit of a PhD degree is the demonstration of a minimum competency in the engineering sciences by achieving a 3.35/4.0 grade point average in a total of five mathematics and core engineering science courses, to be selected as follows:

**Required Core Courses in Mathematics (6 credits):**

- ME 452  Mathematical Methods in Engineering I, plus one of the following courses: OR
- ME 413  Numerical Methods in Mechanical Engineering
- ME 453  Mathematical Methods in Engineering II.

**Required Core Courses in Mechanical Engineering (9 credits):**

Three courses selected from:

- ME 423  Advanced Heat and Mass Transfer
- ME 430  Advanced Fluid Mechanics
- MECH 406  Fundamentals of Solid Mechanics
- MECH 425  Analytical Methods of Dynamics and Vibrations
- ME 402  Advanced Manufacturing Science OR
- ME 401  Integrated Product Development

These five courses may be taken as part of a student's study for a Lehigh Master of Science degree, Master of Engineering degree, or upon entry directly into the PhD program.

All courses to be included in the GPA calculation must be taken during the first three semesters of graduate study if the student is a full-time student; the first five core courses taken by the student are used for the GPA calculation. Core courses may not be retaken.

All PhD students must take ME 453, Mathematical Methods in Engineering II, prior to graduation.

The PhD degree requires a minimum of 72 credit hours if taken at Lehigh, or 48 credit hours if a Master of Science degree was awarded from another accredited institution. Fifteen of these credit hours correspond to the required core courses.

**General Examination**

Only after attainment of a minimum GPA of 3.35/4.0 in the five core courses is a student allowed to proceed with the General Examination. Immediately following successful completion of the core courses, the student forms the Doctoral Committee, which includes the dissertation advisor as the Committee Chair. The minimum number of committee members is four. 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, university lecturers, and courtesy faculty appointees. This latter member 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. The Doctoral Committee is responsible for both administration of the General Exam and oversight of the student's program of study.
The General Examination consists of a detailed review, assessment, and proposed extension of a topic represented by a journal article selected by the Doctoral Committee. The student will have two weeks to prepare and present to the Committee a written document, details of which are defined by the Doctoral Committee. The student will then schedule a presentation of the document to the Committee, followed by questions. The decision on satisfactory completion of the General Examination will be based on both the written document and the presentation. Students are given two opportunities to pass the General Examination.

Research Proposal and Filing for Candidacy at the College Level

During the semester following completion of the General Examination (e.g., the Fall semester following completion of the General Examination during the Spring semester), the student completes a research proposal and applies for formal PhD candidacy at the College level. Formulation of the research proposal for the doctoral program includes not only the research plan, but also an outline of additional coursework. The student presents the proposal in both written and oral form to his/her Doctoral Committee for approval.

Upon Committee approval, the proposal is submitted to the Associate Dean of Graduate Studies of the P. C. Rossin College of Engineering and Applied Science. In addition to the approved proposal, the student submits the original General Exam Signature page, the original Proposal Signature page, a copy of the proposal, and a completed Application to Candidacy form. These documents are given to Ms. Brie Lisk, 314A Packard Lab. Approval of the proposal by the Associate Dean admits the student to candidacy for the PhD in the P. C. Rossin College of Engineering and Applied Science.

Dissertation Preparation and Defense

Upon completion of coursework and research, the candidate prepares a dissertation describing the results and conclusions of his/her research. A written dissertation draft is submitted to the Doctoral Committee, and the candidate presents a public defense of the dissertation. A dissertation defense announcement must be sent to all faculty and graduate students in the department and posted within the department at least one week before the defense is given. A satisfactory defense of the dissertation and acceptance of the written draft by the Doctoral Committee completes the Departmental requirements for the doctoral degree. To complete the degree requirements, especially in this final phase, the dissertation must also conform to the timing and guidelines of the P. C. Rossin College of Engineering and Applied Science, as described in the College Graduate Student Handbook. Candidates should be especially aware of strict timelines for submitting drafts of the dissertation; these timelines are indicated in the academic calendar and are available from the Registrar’s Office.

University and Distance Education Residency Requirements

University Residency Requirement for Distance Education PhD Students

Concentrated Learning Requirement: To fulfill the concentrated learning requirement for the doctoral degree, a candidate must complete two semesters as a full-time graduate student or at least 18 credit hours of Lehigh graduate study within a fifteen-month period either on or off campus. The concentrated learning requirement is intended to ensure that doctoral students spend a period of concentrated study and intellectual association with other scholars. Individual departments may impose additional stipulations. Candidates should check with their advisors to be certain that they have satisfied their concentrated learning requirements.
Department Residency Requirement for Distance Education PhD Students

After a PhD student has passed the General Examination, PhD students who perform their research at a remote location are required to spend two days of intellectual association at Lehigh during each semester of the academic year. Each visit is to include:

(i) A 20 minute presentation given to a defined group of graduate students and a limited number of faculty on a recent research article of direct relevance to the research of the PhD student. This presentation will be followed by extensive discussion and interaction.

(ii) Discussion of issues of mutual research interest with a minimum of three other graduate students engaged in related research at the University. These students may be within the research group of the dissertation adviser or another adviser(s).

The PhD student will submit documentation each semester to the Secretarial Coordinator of the Graduate Program, indicating satisfaction of requirements (i) and (ii). Documentation of requirement (i) will include the complete citation of the journal article that served as the basis for the 20 minute presentation and names of graduate students and faculty present. For requirement (ii), a one page summary of the interactions with other students is required, including their names and highlights as to how the student's own research has been influenced by these discussions.
DEGREE PROGRAM REQUIREMENTS

Master of Engineering Degree and Master of Science Degree*
Mechanical Engineering and Mechanics

Common Requirements for Master of Engineering and Master of Science Degrees

In meeting the requirements for the Master of Science or Master of Engineering degree, the student must satisfy the following common requirements, as outlined in the Graduate Student Handbook.

1. All candidates for a Master’s degree must submit the form entitled Program for Master's Degree as soon as possible after accruing 15 credit hours of courses but no later than the semester before the student graduates. This form is eventually approved by the Registrar. The timing for completion of this form is critical, as it allows for corrections to a student’s course plan if necessary.

2. The minimum program for all Master’s degrees includes:
   - Not less than 30 credit hours of graduate work; audit credits may not be used towards the degree. Research or thesis registration counts as part of the 400-level course requirement.
   - Not less than 24 credit hours of 300- and 400-level coursework of which at least 18 hours is at the 400-level.
   - Not less than 18 credit hours in Mechanical Engineering and Mechanics
   - Not less than 15 credit hours of 400-level coursework in Mechanical Engineering and Mechanics.

3. Eighteen (18) credit hours in the major field of Mechanical Engineering and Mechanics are required. These courses must be 300- and 400-level courses. The remaining twelve (12) credit hours may also be taken in Mechanical Engineering and Mechanics (300- and 400-level courses), or they may be taken in any other field in engineering in which courses for graduate credit are offered, subject to the approval of the student's advisor.

4. A graduate student may include in his or her program courses numbered 200 or higher outside of Mechanical Engineering and Mechanics. These courses must have sufficiently deep engineering/science content comparable to 200 level courses in Mechanical Engineering and Mechanics. Only courses numbered 300 or higher in Mechanical Engineering and Mechanics may be included in a student’s program. A graduate student registered in 200 or 300 level courses may be assigned additional work at the discretion of the instructors. Courses taken outside of Mechanical Engineering and Mechanics are subject to approval by the advisor and the Departmental Graduate Committee.

5. The Master’s degree is not granted unless the candidate has earned grades of B- or better in at least eighteen hours of the work in his/her program and in all 300-level courses in Mechanical Engineering and Mechanics. No course in which the grade earned is less than C- is credited towards the degree.

* Each degree candidate is responsible for ensuring that his/her program is compatible with the degree requirements given in the most recent version of the Lehigh University Catalog and the Graduate Student Handbook of the P. C. Rossin College of Engineering and Applied Science: (http://www.lehigh.edu/engineering/pdf/graduate_student_handbook.pdf).
6. A student who receives more than four grades below B- in courses numbered 200 or higher becomes ineligible to qualify for the Master’s degree or to register for any other 400-level courses.

All incoming masters students, except those brought to the University with full financial support, pursue the Master of Engineering degree (with the option of pursuing a PhD degree). The Master of Engineering degree does not require submittal of a thesis. In the event that a student desires to pursue the Master of Science (thesis) degree, it is necessary to obtain the agreement of a faculty member willing to supervise the thesis research. The availability of faculty for research supervision depends on the specialty within the area of mechanical engineering and the ongoing advisory commitments of the faculty member during a given semester. Those students who wish to pursue the Master of Science degree with a thesis contact faculty members in their area of interest during their first year of study.

Master of Engineering Degree

There are two paths that one may choose for the Master of Engineering degree program.

The first path is a Master of Engineering degree which would include five core courses among 30 credit hours of courses, with the aim of eventually pursuing the PhD degree. In this case, the core course selection is the same as for the Master of Science Degree, as given below. Students who choose this option and have attained a GPA of at least 3.35 in their five core courses, will have completed the first stage of PhD candidacy (at the Department level), and can proceed to the second stage, which involves the General Examination.

The second path is the Master of Engineering degree with some or no core courses. The student takes 30 credit hours of courses, satisfying the requirements indicated under the aforementioned Masters Program Guidelines. If a student subsequently desires to pursue the PhD degree, he/she should aim to complete the five core courses, in order to satisfy the first stage of PhD candidacy.

Master of Science Degree

The program for the Master of Science degree must be comprised of a minimum of 30 credit hours, which includes six hours of thesis credits, distributed as follows:

**Required Core Courses in Mathematics (6 credits):**

- ME 452 Mathematical Methods in Engineering I, plus one of the following courses:
- ME 413 Numerical Methods in Mechanical Engineering; **OR**
- ME 453 Mathematical Methods in Engineering II.

**Required Core Courses in Mechanical Engineering (9 credits):**

Three courses selected from:

- ME 423 Advanced Heat and Mass Transfer
- ME 430 Advanced Fluid Mechanics
- MECH 406 Fundamentals of Solid Mechanics
- MECH 425 Analytical Methods of Dynamics and Vibrations
- ME 402 Advanced Manufacturing Science **OR**
- ME 401 Integrated Product Development
**Free Electives (9 credits)**

Free electives are three additional courses, approved by both the student's advisor and the Departmental Graduate Committee, which complement the student's defined program. This can include coursework in either engineering or any other approved discipline. The courses that are selected for free electives, when considered with all other courses taken for the Master of Science degree, must satisfy the University's course distribution requirements for the Master's degree. These requirements are defined in the Graduate Student Handbook of the College of Engineering and Applied Science and are listed on page 5 of this document.

**Thesis (6 credits)**

Completion of six credits of M.S. thesis (ME 490) is required.

**Department Requirement:**

*Presentation* — The student must complete a professional quality poster and provide a contribution to the Department web page based on his/her M.S. thesis research.

*Thesis* — The Department requires submittal of an unbound, signed copy of the student’s thesis, along with a CD containing a pdf file of the thesis.