

MATERIALS SCIENCE AND ENGINEERING

UNIVERSITY OF DELAWARE

POLICY STATEMENT SUMMARY FOR MASTER OF MATERIALS SCIENCE AND ENGINEERING AND DOCTOR OF PHILOSOPHY IN MATERIALS SCIENCE AND ENGINEERING

December 2018

Graduate degrees (M.M.S.E. and Ph.D.) in Materials Science and Engineering are offered by the interdisciplinary Department of Materials Science and Engineering of the College of Engineering.

The requirements for the M.M.S.E. and Ph.D. are described in the following document “Academic Requirements for Advanced Degrees in Materials”.

A student entering the Materials Science and Engineering Graduate Program normally possesses a bachelor’s (or higher) degree in a physical science or engineering discipline. A successful candidate for admission would minimally have taken courses to the following levels: mathematics, through partial differential equations; physics, including mechanics, heat, electricity, magnetism and introductory modern physics; chemistry, through physical chemistry; and introduction to materials science. In addition, courses in thermodynamics, field concepts, phase transformations, and structure and mechanical properties of materials are considered very useful.

Students who have not yet completed their bachelor’s degree may only be admitted under a special program, such as the 4+1 program for qualified UD undergraduates or in another joint program (e.g. 3+2) for schools with which an articulation agreement is in effect. The admissions requirements for these programs are otherwise the same as for other applicants as delineated below.

Admission requirements are normally (1) completion of a bachelor’s program with a GPA

of at least 3.2, (2) competitive GRE score of at least 155 or higher for Quantitative and 300 or higher for Quantitative + Verbal and for applicants with the older GRE test – at least 700 for Quantitative and 1200 or higher for Quantitative + Verbal, (3) three excellent letters of recommendation from faculty or scholars. Admission decisions are made by the Materials Science and Engineering Faculty on the advice of its Chairperson and/or Graduate Admissions Committee.

Admission to the graduate program is competitive. Those who meet stated requirements are not guaranteed admission, nor are those who fail to meet all of those requirements necessarily precluded from admission if they offer other appropriate strengths.

The Master’s thesis must be accepted by both the research advisor and the Chairperson of the Materials Science and Engineering Faculty. A formal defense of the Master’s thesis before the committee may be required. The Ph.D. dissertation must be defended before the student’s advisory committee. That committee consists of the student’s research advisor and at least three other members, at least one of whom must be from outside of the Materials Science and Engineering Faculty. The Ph.D. Committee will be set up at the time of the student’s Ph.D. Qualifier, within the student’s first five semesters, and will meet with the student annually. The thesis or dissertation must meet the criterion of scholarly excellence and there must be no barriers to its publication.

Stipend and tuition support is awarded to meritorious students. The authorization of such support resides with the Chairperson of the Department.

Academic Requirements for Advanced Degrees

In

DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

In order to receive an advanced degree, a student must satisfy both the University's basic requirements and the programmatic requirements given below. Deviations from the program outlined below may be authorized in writing by the faculty advisor to the Chairperson and to the Graduate Office in exceptional circumstances such as may apply for transfer students or students entering the Department in the Spring.

A. Degree of Master of Materials Science and Engineering

Two options are available, one with a thesis and the other by lecture course credit only. The first is available to all students. The second is intended for outreach or part-time students and does not require a thesis. Transfer between options is permitted only upon the recommendation of the student's research advisor and with the approval of the Department Chairperson and the Chair of the graduate committee.

Master of Materials Science and Engineering with Thesis

1. 24 credit hours of course work and 6 credit hours of thesis research are necessary for the thesis-option Master's degree (30 total credits required).
2. The following courses, totaling 9 credits, are required of all students. Equivalent courses may be substituted as approved by the faculty advisor and Chairperson:

MSEG 608 Structure and Properties of Materials I (3 credits)
MSEG 803 Equilibria in Materials Systems (3 credits)
MSEG 804 Kinetics in Materials Systems (3 credits)

3. Students may choose two courses from the following four courses with their advisor (6 credits total required). Any students taking more than the required two courses may count those additional courses as technical electives.

MSEG 640 Applied Quantum Mechanics I (3 credits)
MSEG 841 Solid State Materials I (3 credits)
MSEG 832 Principles of Polymer Synthesis (3 credits)
MSEG 835 Polymer Physics (3 credits)
MSEG817 Composite Materials (3 credits)

4. Technical Electives (three courses – 9 credits total required). These courses should be chosen with student’s advisor, and will usually be related to the student’s area of research. MSEG 868 – Research may not be taken as Technical Electives.
5. Six credit hours of thesis work, MSEG869, must be completed and the thesis must be accepted by the student’s advisory committee and the Department Chairperson.
6. Students must complete the required credits of course work with an average GPA of 3.00 or higher.
7. All graduate students are expected to attend departmental seminars.
8. Master’s Thesis: A thesis containing original results of the student’s research effort must be presented and approved by the student’s research advisor and the Department Chairperson.

Master of Materials Science and Engineering without Thesis

1. 30 credit hours of course work are required for the Master’s degree without a thesis.
2. The following courses, totaling 9 credits, are required of all students. Equivalent courses may be substituted as approved by the faculty advisor and Department Chairperson:
 - MSEG 608 Structure and Properties of Materials I (3 credits)
 - MSEG 803 Equilibria in Materials Systems (3 credits)
 - MSEG 804 Kinetics in Materials Systems (3 credits)
3. Students may choose two courses from the following four courses with their advisor (6 credits total required). Any students taking more than the required two courses may count those additional courses as technical electives.
 - MSEG 640 Applied Quantum Mechanics I (3 credits)
 - MSEG 841 Solid State Materials I (3 credits)
 - MSEG 832 Principles of Polymer Synthesis (3 credits)
 - MSEG 835 Polymer Physics (3 credits)
 - MSEG817 Composite Materials (3 credits)
4. Technical Electives (three courses – 15 credits total required). These courses should be chosen with student’s advisor, and will usually be related to the student’s area of research. MSEG 868 – Research may not be taken as Technical Electives.
5. Students must complete the required credits of course work with an average GPA of 3.00 or higher.
6. All graduate students are expected to attend departmental seminars.

7. Candidates for the Master's Degree without thesis may be asked to demonstrate their comprehensive knowledge of materials science by successfully completing a final project. If so, the project consists of a written analysis and research project proposal on a topic chosen by the candidate and his/her advisor. The written report should contain **no more than 15 pages single-spaced (12-pt. Font)** not including the bibliography. The written report should cover at least the following topics/issues:
 - a. Motivation and Significance of the Research
 - b. Definition of the Critical Issues
 - c. Literature Search/Bibliography
 - d. Research Objectives
 - e. Outline of a feasible Experimental/Theoretical Approach
 - f. Anticipated Results
 - g. Potential Impact (scientific or technological)

The written report must be approved by the student's faculty advisor and the Department Chairperson.

B. Ph.D. Degree in Materials Science and Engineering

1. 24 credit hours of course work and 9 credit hours of dissertation research are required for the Ph.D. Degree (33 total credits required). The distribution of required credits is described below.
2. Direct entry to the Ph.D. Program without prior completion of a Master's Degree is available for suitably qualified candidates.
3. The department may waive the requirement for up to 15 credit hours of course work for students entering the Ph.D. program with a Master's Degree or credits for graduate course work performed at another recognized/accredited graduate school. The primary purpose of these waivers is to provide students the opportunity to take courses that extend their depth and breadth of knowledge. Because these courses are waived, not transferred, a student must still meet the department's required number of total credits (33) by taking other courses or research credits, as determined in collaboration with his/her advisor. Waivers will only be granted for courses that cover subjects eligible for credit toward a Ph.D. in Materials Science and Engineering from the University of Delaware, and all waivers are at the discretion of the Graduate Committee in consultation with other faculty members. Typically, waivers are only available for MSEG "Required Courses" (i.e. not technical electives) and a student's advisor can require him/her to take additional classes to make up for waived classes. In order to request a waiver, students should submit an MSEG Course Waiver Form, syllabi, course description, and grades received for the courses that the student considers a substitute. The student must initiate requests for a course waiver before the beginning of their second semester at UD. The waiver must be approved by the Graduate Program Director (in consultation with the

Graduate Program Committee) and will be contingent on the student's demonstration of satisfactory performance in course work taken at UD.

4. The following courses, totaling 9 credits, are required. Equivalent courses may be substituted when approved by the faculty advisor and Department Chairperson:

MSEG 608 Structure and Properties of Materials I (3 credits)
MSEG 803 Equilibria in Materials Systems (3 credits)
MSEG 804 Kinetics in Materials Systems (3 credits)

5. Students may choose two courses from the following four courses with their advisor (6 credits total required). Any students taking more than the required two courses may count those additional courses as technical electives.

MSEG 640 Applied Quantum Mechanics I (3 credits)
MSEG 841 Solid State Materials I (3 credits)
MSEG 832 Principles of Polymer Synthesis (3 credits)
MSEG 835 Polymer Physics (3 credits)

6. Technical Electives (three courses – 9 credits total required). These courses should be chosen with student's advisor, and will usually be related to the student's area of research. MSEG 868 – Research may not be taken as Technical Electives.
7. Students must complete the required credits of course work with an average GPA of 3.00 or higher.
8. A student can take 9 credits of MSEG964 – Pre-Candidacy in the semester they plan to take their Ph.D. Qualifying Exam. If they pass, and are admitted to Doctoral Candidacy, these 9 credits can be switched to 9 of the required MSEG969. If they do not take Pre-Candidacy credits, after admission to Doctoral Candidacy, the student must complete 9 credit hours of Dissertation MSEG 969.
9. All graduate students are expected to attend departmental seminars.
10. MSEG Ph.D. Qualifying Exam – [See information on this page.](#)