

# MATERIALS SCIENCE AND ENGINEERING, PHD

## Admission Requirements

To be admitted to graduate study in the Department of Materials Science and Engineering, students must submit credentials sufficient to convince the faculty that they have the potential to successfully complete the program requirements.

A graduate student pursuing a Ph.D. with the Department of Materials Science and Engineering who is funded by the department as a teaching assistant or research assistant may not enroll simultaneously in a master's program in another department, unless they receive written approval from their advisor, the DMSE Doctoral Program Committee, and the department chair/head.

Please visit the WSE Graduate Admissions website (<https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/how-to-apply/>) for more information.

## Program Requirements

To receive the Ph.D. degree, the candidate must fulfill the requirements below. The department must be satisfied that all academic requirements have been satisfied by the candidate before a recommendation will be made to the University Graduate Board to confer the Ph.D. degree.

### 1. Successful completion of four required courses in materials science and engineering.

Code	Title	Credits
EN.510.601	Structure Of Materials	3
EN.510.602	Thermodynamics Of Materials	3
EN.510.603	Phase Transformations of Materials (or)	3
EN.510.610	Fundamentals of Biomaterials	3
EN.510.615	Physical Properties of Materials	3

Each of the four required courses must be passed with a letter grade of B- or higher. If a student receives a grade of C+ or lower in a required course, the student may re-take the course once to achieve a grade of B- or higher. Receipt of grades of C+ or lower in two or more required courses will ordinarily be cause for dismissal from the program without the opportunity to re-take those courses.

In addition, the student must maintain an overall GPA of 3.0 or better in the four required courses. If the student's GPA falls below 3.0, the student must re-take one or more of the required courses and earn higher grade(s). Upon doing so the prior grade(s) in those course(s) are replaced and not counted toward the GPA.

**Deadline for Completion:** The four required courses must be successfully completed (meeting the grade and GPA requirements above) no later than the start of the student's third year after matriculation; failure to do so will result in dismissal from the program. Exception: A student who fails to meet the requirements above due to a low grade in a single required course, and who has not had an opportunity to re-take that course during the first two years, will be permitted to re-take that one course in the third year.

**Waiver of required courses:** Students may submit a petition to the Doctoral Program Committee to waive one of the required courses under either of the following conditions:

- Students who have an undergraduate degree in Materials Science & Engineering may waive EN.510.615.
- Students who have completed prior graduate-level coursework substantially similar to one of the other courses, EN.510.601 Structure Of Materials, EN.510.602 Thermodynamics Of Materials or EN.510.603 Phase Transformations of Materials or EN.510.610 Fundamentals of Biomaterials may waive that course.
- Students desiring a waiver of a required course must submit their petition no later than the end of the first semester after matriculation. If the petition requests a waiver on the basis of graduate-level coursework taken elsewhere, documentation of the course level, content (syllabus) and grade received must be included in the petition

### 2. Successful completion of three advanced (600-level or higher) elective courses in materials science and engineering or a related field.

- Elective courses must be completed with a grade of C or higher, but there is no cumulative GPA requirement. Any 600-level or higher regular course in materials science and engineering may be used to fulfill this requirement. Courses from other departments may also be used, but must either appear on the list of approved electives (available from the Academic Program Administrator) or be approved by the Doctoral Program Committee. Students wishing to use a course not on this list must submit a request to the Doctoral Program Committee no later than the end of the first week of the semester in which the course is taken.

The following courses may not be used to fulfill the Ph.D. elective course:

- Undergraduate courses, unless cross-listed at 600-level or higher
- Graduate Research (EN.510.807 or EN.510.808)
- Courses in part-time graduate programs (Engineering for Professionals in WSE or Advanced Academic Programs in KSAS), unless by rare exception by the Doctoral Program Committee with an endorsement from the student's advisor;
- Seminars (courses with fewer than three contact hours per week)

**Waiver of elective courses:** Students who have completed prior graduate-level coursework may petition the Doctoral Program Committee to waive one of the elective courses. Students desiring such a waiver must submit a petition, no later than the end of the first semester after matriculation, describing the course they wish to use to fulfill this requirement. Documentation of the course level, content (syllabus) and grade received must be included in the petition.

In some cases, an advisor may require a student to complete additional coursework, beyond the four required courses and three electives described above.

### 3. Coursework required by Whiting School of Engineering policy. These include the following:

1. Responsible Conduct of Research training (AS.360.624 Responsible Conduct of Research (Online) or AS.360.625 Responsible Conduct of Research) in accordance with Whiting School of Engineering policy. Details about this requirement, including the criteria for determining whether the online or in-person course must be taken, are provided in the description of the policy (<https://engineering.jhu.edu/wse-research/resources-policies-forms/responsible-conduct-of-research/>).

2. Training on academic ethics in accordance with Whiting School of Engineering policy (<https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/>). This requirement can be satisfied by passing EN.500.603 Graduate Orientation and Academic Ethics.
3. Attendance is required at the weekly Department of Materials Science & Engineering Seminar (EN.510.803 or EN.510.804)

**4. Teaching Assistant Requirement: Students in their second year in the department will be required to act as teaching assistant for two courses.**

**5. Successful completion of a comprehensive oral examination. The exam is offered semiannually, usually the week before the beginning of the fall semester and the spring semester. The exam covers three areas of materials science and engineering:**

- Structure of Materials
- Thermodynamics of Materials
- Either Kinetics and Phase Transformations in Materials OR Biomaterials (at the student's choice)

Although these subject areas correspond to the four core courses, the topics covered in the exam are not strictly limited to material covered in those courses. Furthermore, each section may include questions related to the properties of materials at a level similar to that covered in EN.510.615 (Physical Properties of Materials).

Additional information about the oral exam is provided in the document *Information for Doctoral Students regarding the oral comprehensive examination*, available from the Academic Program Coordinator.

**6. A proposal for a research project to form the basis of the candidate's dissertation.**

Each student must write a dissertation proposal (<https://engineering.jhu.edu/materials/wp-content/uploads/2021/07/DMSE-thesis-proposal-guidelines.pdf>) and present it orally at a public seminar no later than the end of the sixth semester following matriculation. The written dissertation proposal must be submitted to the department no later than two weeks prior to the scheduled date of the oral presentation. The public seminar will be followed by a closed session with a committee consisting of the research advisor and two other faculty members (to be selected in consultation with the advisor). During the closed session, the committee members will ask questions about and provide comments on the proposed plan of research. The thesis proposal is also an examination, with the committee testing the candidate's depth of knowledge in their area of specialization (and not only on the proposed research). Students who do not successfully complete the dissertation proposal requirement by the end of the sixth semester following matriculation will be placed on probation, with a specified time limit (ordinarily no more than six months) within which to complete this requirement and be removed from probation. Students on probation who do not complete the dissertation proposal requirement within the specified time limit will be dismissed from the program.

**7. Completion of an original research project, documented in a dissertation that is defended by the candidate in a public presentation.**

Candidates must write a dissertation conforming to university requirements that describes their work and results in detail. A public defense of the dissertation is required, and will be followed by a closed examination session. The committee for the closed examination shall consist of five faculty members, chosen by the Doctoral Program Committee, with at least two members being from outside the department. The outcome of the closed examination will be decided

by majority vote of the committee. Because the closed examination session fulfills the university Graduate Board Oral (GBO) examination requirement, all procedures pertaining to GBOs as established by the University Graduate Board must be followed.

The committee may impose certain conditions (e.g. changes to the dissertation) for the candidate to meet prior to final certification that they have passed the exam. For this reason, the thesis defense must be scheduled for a date at least two months prior to any personal or university deadline for degree completion. A complete draft of the dissertation must be submitted to all committee members no later than two weeks prior to the defense.

The dissertation in its final form must be read and approved in writing by two members of the committee (the advisor and one other member to be chosen by the committee as a whole).