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. Under the new GRE test, applicants should take the General Test package containing the Mathematical Reasoning test.

A graduate student pursuing a Ph.D. degree 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 he or she receives written approval from his or her advisor, the DMSE Graduate Program Committee, and the department chairman.

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.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN.510.601</td>
<td>Structure Of Materials</td>
<td>3</td>
</tr>
<tr>
<td>EN.510.602</td>
<td>Thermodynamics Of Materials</td>
<td>3</td>
</tr>
<tr>
<td>EN.510.603</td>
<td>Phase Transformations of Materials</td>
<td>3</td>
</tr>
<tr>
<td>EN.510.615</td>
<td>Physical Properties of Materials</td>
<td>3</td>
</tr>
</tbody>
</table>

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.

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 course in the third year.

Students who have completed prior graduate-level coursework similar to EN.510.601 Structure Of Materials, EN.510.602 Thermodynamics Of Materials or EN.510.603 Phase Transformations of Materials may petition the Doctoral Program Committee to waive the Physical Properties course. However, only one of the four required courses can be waived. If approved, the course that has been waived will not be counted toward calculation of the GPA as described above. Written requests for such waivers must be submitted to the Doctoral Program Committee no later than the end of the first semester after matriculation. Please note that transfer coursework grades do not count towards calculation of the GPA.

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. A list of approved electives is available from the Academic Program Coordinator. 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.

Graduate research (EN.510.807 Graduate Research In Materials Science-EN.510.808 Graduate Research), part-time graduate courses (from Engineering for Professionals in WSE or Advanced Academic Programs in KSAS), and seminars (courses with less than three contact hours per week) will not be counted toward completion of Ph.D course requirements. Undergraduate courses (400-level or lower) will not be counted unless they are cross-listed as graduate level, 600 or higher. Independent study courses may be used with prior approval of the Doctoral Program Committee.

Students who have completed prior graduate-level coursework may petition the Doctoral Program Committee to waive one of the required elective courses. Written requests for such waivers must be submitted to the Doctoral Program Committee no later than the end of the first semester after matriculation.

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

3. Attendance is required at the weekly Department of Materials Science and Engineering Seminar.

4. Coursework required by Whiting School of Engineering policy. These include the following:
   a. 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/).
   b. 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.

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

6. Successful completion of a comprehensive oral examination covering fundamentals of materials science and engineering. The
comprehensive examination tests knowledge in each of the subjects listed below:
Structure of Materials
Thermodynamics of Materials
Phase Transformations in Materials

In each of the three subject areas, students may be asked questions related to the properties of materials. The depth of required knowledge regarding properties of materials will match the level of knowledge presented in the Physical Properties of Materials class.

Successful completion of the comprehensive exam requires satisfactory performance on all areas tested; there are no partial or conditional passes.

The comprehensive exam is offered semiannually, usually immediately prior to the fall and spring semesters. A student who fails the exam on the first try may make a second attempt, but the exam must be successfully completed no later than the start of the third year following matriculation. Failure to do so will result in dismissal from the program.

7. A proposal for a research project to form the basis of the candidate’s dissertation.
Each student must write a thesis proposal 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 his/her 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.

8. 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 he or she has 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 adviser and one other member to be chosen by the committee as a whole).