

MATERIALS SCIENCE & ENGINEERING, PHD

for the degree of Doctor of Philosophy in Materials Science & Engineering

Opportunity exists for specializing in

- i) biomechanics via the Biomechanics (<http://catalog.illinois.edu/graduate/engineering/concentration/biomechanics/>) optional graduate concentration,
- ii) cancer nanotechnology via the Cancer Nanotechnology (<http://catalog.illinois.edu/graduate/engineering/concentration/cancer-nanotechnology/>) optional graduate concentration, and
- iii) computational science and engineering via the Computational Science & Engineering (<http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/>) optional graduate concentration.

The Department of Materials Science & Engineering (MatSE) offers graduate programs leading to degrees of Master of Science and Doctor of Philosophy in Materials Science & Engineering. The department is consistently ranked among the top programs in the nation (undergraduate and graduate) by U.S. News and World Report. It offers opportunities to specialize in Nanoscale Science and Technology, Materials for Energy and the Environment, Materials for Medicine, and Mechanical Properties and Materials for Extreme Conditions with strong research programs in all of the areas.

Department Research

The backgrounds of faculty members vary widely within the broad areas of Nanoscale Science and Technology, Materials for Energy and the Environment, Materials for Medicine, and Mechanical Properties and Materials for Extreme Conditions. In addition, research collaborations with other faculty outside the department are frequent. For a detailed list of faculty research interests and publications, view the MatSE department's faculty biographies. (<https://matse.illinois.edu/directory/faculty/>)

The MatSE department has an outstanding array of facilities available for materials research. These facilities, in addition to laboratories in the department's buildings, include, among others, the Materials Research Laboratory, Center for Microanalysis of Materials, Beckman Institute for Advanced Science and Technology, and Micro and Nanotechnology Laboratory. The National Center for Supercomputing Applications and the MRL Center for Computation are readily available. Information about these facilities may be found at the MatSE department's facilities information Web site (<http://www.matse.illinois.edu/research/facilities.html>).

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For additional details and requirements, please refer to the department's Graduate Degree Requirements Handbook (<https://matse.illinois.edu/academics/graduate-programs/>) and the Graduate College Handbook (<http://grad.illinois.edu/gradhandbook/>).

Entering with approved M.S. degree

Code	Title	Hours
MSE 599	Thesis Research (min-max applied toward the degree)	44
One of CHEM 544, MSE 500, PHYS 504 with a grade of B or higher		4
MSE 492	Lab Safety Fundamentals (credit does not apply toward the degree)	0
MSE 595	Materials Colloquium	0-2
Advisor group meetings (MSE 590) and area seminars (MSE 529, MSE 559) (subject to Other Requirements and Conditions below)		0-4
Elective courses (subject to Other Requirements and Conditions below)		10-16
Total Hours		64

Other Requirements and Conditions

Requirement	Description
Other Requirements and Conditions may overlap	
MSE course work hours	10
500-level credit hours applied toward the degree	10
MSE 595 (0 or 1 hour) must be taken every semester in the first two years of residence. A maximum of 2 hours may be applied toward the degree.	
MSE 529 or MSE 559 (0 or 1 hours) must be taken every semester. A maximum of 4 hours may be applied toward the degree.	
Ph.D. exam and dissertation requirements:	
Qualifying exam	
Preliminary exam	
Final exam or dissertation defense	
Dissertation deposit	
Minimum GPA:	3.0

Entering with approved B.S. degree

Code	Title	Hours
MSE 599	Thesis Research (min-max applied toward the degree)	52
One of CHEM 544, MSE 500, PHYS 504 with a grade of B or higher		4
MSE 492	Lab Safety Fundamentals (credit does not apply toward the degree)	0
MSE 595	Materials Colloquium	0-4

Advisor group meetings (MSE 590) and area seminars (MSE 529, MSE 559) (subject to Other Requirements and Conditions below)	0-8
Elective courses (subject to Other Requirements and Conditions below) (28-40 hours)	28-40
Total Hours	96

Other Requirements and Conditions

Requirement	Description
Other Requirements and Conditions may overlap	
MSE course work hours	10
500-level credit hours applied toward the degree	10
MSE 595 (0 or 1 hour) must be taken every semester in the first two years of residence. A maximum of 4 hours may be applied toward the degree.	
MSE 529 or MSE 559 (0 or 1 hours) must be taken every semester. A maximum of 8 hours may be applied toward the degree.	
These students may earn a Master of Science degree during the Ph.D. program.	
Ph.D. exam and dissertation requirements:	
Qualifying exam	
Preliminary exam	
Final exam or dissertation defense	
Dissertation deposit	
Minimum GPA:	3.0

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1. The ability of students to function as independent scientists and engineers.
2. A deep understanding of the underlying principles of the appropriate theories in their subject area.
3. A deep understanding of the underlying principles of the synthesis and preparation of their subject materials.
4. A deep understanding of the underlying principles of characterization of their subject materials.
5. A deep understanding of the underlying principles of processing of their subject materials.
6. A deep understanding of interrelationships of structure, processing and properties of their subject materials.
7. A broad knowledge of the preparation, characterization and processing of all types of materials.

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<http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/>) optional graduate concentration, and iii) computational science and engineering via the Computational Science & Engineering (<http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/>) optional graduate concentration.

Admission Requirements

Students with bachelor's or master's degrees in the natural sciences or engineering will be considered for admission if they have a grade point average of at least 3.00 (A = 4.00) for the last two years of undergraduate study. The general test of the Graduate Record Examination (GRE) (<http://www.ets.org/>) is required. Admission is possible for the spring semester under special circumstances, but most admissions are for the fall semester. Full details of admission requirements are on the department's graduate admissions Web site (<https://matse.illinois.edu/admissions/graduate-admissions/>). (<https://matse.illinois.edu/admissions/graduate-admissions/>)

All applicants whose native language is not English are required to submit the results of the TOEFL (<http://www.toefl.org/>) or International English Language Testing System (IELTS) (<http://www.ielts.org/>) as evidence of meeting the English proficiency requirements for full admission status (<http://grad.illinois.edu/admissions/instructions/04c/>). Under certain circumstances applicants may be exempt (<https://grad.illinois.edu/admissions/instructions/04c/>) from the TOEFL/IELTS requirement.

Financial Aid

Financial aid is available in the form of research assistantships, teaching assistantships, and partial fellowships for students in the PhD programs. All applicants to the MatSE PhD program are automatically considered for financial support in the form of a research assistantship. Starting in Fall 2020, Grainger Engineering PhD students in their first five years of enrollment who meet the minimum eligibility requirements (<https://grainger.illinois.edu/academics/graduate/phd-funding-guarantee/>) are guaranteed a funded appointment for fall and spring that includes a full tuition waiver, a partial fee waiver, and a stipend.

All applicants, regardless of US citizenship, whose native language is not English and who wish to be considered for teaching assistantships must demonstrate spoken English language proficiency (<http://grad.illinois.edu/admissions/taengprof.htm>) by achieving a minimum score of 24 on the speaking subsection of the TOEFL iBT or 8 on the speaking subsection of the IELTS. For students who are unable to take the TOEFL iBT or IELTS, a minimum score of 4CP, 5 or 6 is required on the EPI test (http://cte.illinois.edu/testing/ora_eng/epi_overview.html), offered on campus. All new teaching assistants are required to participate in the Graduate Academy for College Teaching (<https://citl.illinois.edu/citl-101/teaching-learning/grad-academy-for-college-teaching/>) conducted prior to the start of the semester.

Graduate Programs in Materials Science & Engineering

- Materials Science & Engineering, MS (<http://catalog.illinois.edu/graduate/engineering/materials-science-engineering-ms/>)
- Materials Science & Engineering, PhD (p. 1)
 - optional concentrations (p. 1)
 - Biomechanics (<http://catalog.illinois.edu/graduate/engineering/concentration/biomechanics/>)
 - Cancer Nanotechnology (<http://catalog.illinois.edu/graduate/engineering/concentration/cancer-nanotechnology/>)

- Computational Science & Engineering (<http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/>)
- Data Science & Engineering (<http://catalog.illinois.edu/graduate/engineering/concentration/data-science-engineering/>)

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Materials Science & Engineering

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Director of Graduate Studies: Moonsub Shim (mshim@illinois.edu)
Materials Science & Engineering website (<https://matse.illinois.edu>)
Materials Science & Engineering faculty (<https://matse.illinois.edu/people/faculty/department-faculty/>)
Graduate Programs (<https://matse.illinois.edu/academics/graduate-programs/>) in Materials Science & Engineering (<https://matse.illinois.edu>)
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Grainger College of Engineering

Grainger College of Engineering website (<https://grainger.illinois.edu/>)

Admissions

Materials Science & Engineering Admissions (<https://matse.illinois.edu/admissions/graduate-admissions/>)
Graduate College Admissions & Requirements (<https://grad.illinois.edu/admissions/apply/>)