

MECHANICAL ENGINEERING, PHD

for the degree of Doctor of Philosophy in Mechanical Engineering

The Department of Mechanical Science & Engineering offers both a traditional doctoral program (for students with a previous master's degree) and a direct doctoral program (for students with only a bachelor's degree) in Mechanical Engineering.

Opportunity exists for specializing in computational science and engineering via the Computational Science & Engineering (<http://catalog.illinois.edu/graduate/engineering/concentration/computational-science-engineering/>) optional graduate concentration.

Graduate Teaching Experience

Although teaching is not a general Graduate College requirement, experience in teaching is considered an important part of the graduate experience in both the ME and TAM PhD programs.

Department Research

A new paradigm in research is being created in the department by integrating basic sciences such as biology, chemistry, applied mathematics, and applied physics with the traditional mechanical engineering and engineering mechanics disciplines of fluid mechanics/thermal sciences, solid mechanics/materials and controls/dynamics. This integration is fostering new directions and discoveries in nanomechanics, nanomanufacturing, biomechanics and computational science and engineering.

The goal of all research in the department is to address critical societal problems in the areas of health, security/defense, energy/environment, manufacturing, and transportation. While the basic function of departmental research is generation of new knowledge, a growing number of projects are prompted by current needs of the state of Illinois, the United States, and the world. For more information, see the department's research website (<https://mechanical.illinois.edu/research/>).

MechSE faculty are major participants in activities at the department, college, and university level via research centers and programs that are integral to the MechSE graduate program. For more information, see the department's research centers website (<https://mechanical.illinois.edu/mechse-research-centers/>).

MechSE's wealth of research laboratories allows faculty, graduate and undergraduate research assistants, and postdoctoral and visiting scholars to conduct theoretical and experimental investigations of phenomena related to materials behavior, combustion, micro- and nanomechanical systems, controls and dynamics, thermodynamics, biomechanics, and much more. For more information, see the department's research laboratories website (<https://mechanical.illinois.edu/research/mechse-laboratories/>).

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For the Ph.D. program, a preliminary examination is taken after the qualifying examination. A minimum of six months should elapse between the successful completion of the doctoral preliminary examination and the doctoral final examination (oral dissertation defense).

For additional details and requirements refer to the department's graduate program requirements (<http://mechanical.illinois.edu/graduate/>) and the Graduate College Handbook (<http://grad.illinois.edu/gradhandbook/>).

Entering with approved M.S. or M.A. degree

| Code | Title | Hours |
|--------------------|---|-----------|
| ME 599 | Thesis Research (min-max applied toward the degree) | 44 |
| MSE 492 | Lab Safety Fundamentals (1 hour if not taken while completing the Master's degree; credit does not apply toward the degree) | 0 |
| ME 590 | Seminar (registration for 1 hour every term while in residence; credit does not apply toward the degree) | 0 |
| | Advanced math requirement from an approved list (https://mechse.illinois.edu/graduate/graduate-degree-programs/phd-programs/phd-mechanical-engineering/) | 3-4 |
| | Elective courses – chosen in consultation with advisor (subject to Other Requirements and Conditions below) | 16-17 |
| Total Hours | | 64 |

Other Requirements and Conditions (may overlap)

| Requirement | Description |
|--|-------------|
| Minimum 500-level credit hours applied toward the degree | 16 |
| Maximum hours of ME 597 or TAM 597 (or other approved independent study) which may be applied only toward the elective course work requirement | 4 |
| A maximum of 4 hours of ME 597 or TAM 597 (or other approved independent study) may be applied toward the elective course work requirement. | |
| No ME 599 credit may be applied toward the elective course work requirement. | |
| Minimum GPA: | 3.0 |
| Continuous registration is required after the preliminary exam and until dissertation deposit, while on campus and during semester of final defense. | |

Ph.D. exam and dissertation requirements:

Qualifying Exam: Qualifying examinations should be taken no later than the second calendar semester after initial enrollment.

Preliminary exam

Final exam or dissertation defense

Dissertation deposit

Entering with approved B.S. or B.A. degree

A student entering with a bachelor's degree has the option of a direct Ph.D. program. It does not award an M.S. degree.

| Code | Title | Hours |
|---|---|-----------|
| ME 599 | Thesis Research (min-max applied toward the degree) | 52 |
| MSE 492 | Lab Safety Fundamentals (1 hour if not taken while completing the Master's degree; credit does not apply toward the degree) | 0 |
| ME 590 | Seminar (registration for 1 hour every term while in residence; credit does not apply toward the degree) | 0 |
| Advanced math requirement from an approved list (https://mechse.illinois.edu/graduate/graduate-degree-programs/phd-programs/phd-mechanical-engineering/) | | 3-4 |
| Elective courses – chosen in consultation with advisor (subject to Other Requirements and Conditions below) | | 40-41 |
| Total Hours | | 96 |

Other Requirements and Conditions (may overlap)

| Requirement | Description |
|--|-------------|
| Minimum 500-level credit hours applied toward the degree | 24 |
| Maximum hours of ME 597 or TAM 597 (or other approved independent study) which may be applied only toward the elective course work requirement | 8 |
| A maximum of 4 hours of ME 597 or TAM 597 (or other approved independent study) may be applied toward the elective course work requirement. | |
| No ME 599 credit may be applied toward the elective course work requirement. | |
| Continuous registration is required after the preliminary exam and until dissertation deposit, while on campus and during semester of final defense. | |
| Ph.D. exam and dissertation requirements: | |
| Qualifying Exam: Qualifying examinations should be taken as early as possible, generally no later than the third semester. | |
| Preliminary exam | |

Final exam or dissertation defense

Dissertation deposit

Minimum GPA: 3.0

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Illinois MechSE ME graduates will have:

1. A deep understanding of at least one core area of Mechanical engineering (e.g., mechanics of materials, combustion, controls and dynamics, manufacturing, fluid mechanics, solid mechanics). [MS/PhD]
2. A broader understanding of at least 1-2 areas of Mechanical Engineering that are different from the area of research of the student's thesis. [MS/PhD]
3. Ability to think critically and creatively in defining research questions and to outline strategies of inquiry. [MS/PhD]
4. Ability to document research outcomes comprehensively for publication. [MS/PhD]
5. Ability to communicate research results to scientific audience in conferences. [PhD]
6. Ability to work collaboratively with other peers. [MS/PhD]

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Admission Requirements

An applicant for admission to the PhD program in Mechanical Engineering in Department of Mechanical Science and Engineering must:

1. Be a graduate of an institution awarding a baccalaureate degree equivalent to that granted by the University of Illinois at Urbana-Champaign;
2. be adequately prepared for advanced study as demonstrated by his or her previous program of study and scholastic record; and
3. be recommended for admission by the Department of Mechanical Science and Engineering. A minimum grade point average of 3.25 (A = 4.00) for the last two years of undergraduate study is required, and a minimum grade point average of 3.50 (A = 4.00) is required for any previous graduate work completed.

Currently the Graduate Record Examination (GRE) (<http://www.ets.org/>) is not required for the admission application, but a student may elect to submit their scores.

All applicants whose native language is not English are required to submit TOEFL (<http://www.toefl.org/>) or International English Language Testing System (IELTS) (<http://www.ielts.org/>) scores as evidence of English proficiency. Minimum admission requirements (<https://grad.illinois.edu/admissions/instructions/04c/>) are set by the Graduate College.

The Department of Mechanical Science and Engineering accepts PhD applications for both Spring and Fall terms.

For detailed information, please see our admissions requirements webpage (<https://mechse.illinois.edu/graduate/applying-mechse-graduate-programs/>).

Financial Aid

Students admitted to the PhD program are eligible for Board of Trustees (BOT) tuition-waiver generating appointments at the University of Illinois, including research assistantships, teaching assistantships, and fellowships. 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 whose native language is not English, regardless of US citizenship, 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 8.0 on the speaking subsection of the IELTS. Students who are already at Illinois may request to take the on-campus EPI test (http://cte.illinois.edu/testing/oral_eng/epi_overview.html), for which the minimum passing score for TA eligibility is 4CP. 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/>) prior to the start of their first semester as a teaching assistant.

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Department of Mechanical Science & Engineering

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Department of Mechanical Science & Engineering Department website (<https://mechanical.illinois.edu/>)

Program website (<https://mechanical.illinois.edu/graduate/graduate-degree-programs/phd-programs/>)

Mechanical Science & Engineering Department faculty (<https://mechanical.illinois.edu/people/>)

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Mechanical Science & Engineering email (mechse-grad@illinois.edu)

Grainger College of Engineering

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

Admissions

Mechanical Science & Engineering Department Overview of Admissions & Requirements (<https://mechanical.illinois.edu/graduate/applying-mechse-graduate-programs/>)

Graduate College Admissions & Requirements (<https://grad.illinois.edu/admissions/apply/>)