

# PhD in Mechanical Engineering

The PhD degree is usually a four-year program which requires rigorous study and a high degree of emphasis on original research. PhD graduates take up positions in academic institutions, design, services and consulting companies.

## Admission

Following are the minimum requirements for applying to the PhD in mechanical engineering program.

1. Cumulative GPA in graduate coursework: Students admitted to the PhD in mechanical engineering degree program must have a GPA of 3.250/4.000 or better in Masters-level degree.
2. Evidence of independent research such as publications.
3. Two letters of recommendation.
4. A Statement of Purpose on the applicant’s research interests.
5. Undergraduate Coursework similar to ABET-accredited US engineering degree with equivalent courses.
6. A master’s degree in mechanical or closely related engineering, or physical sciences.

## Direct PhD Admission of BS Graduates in Mechanical Engineering

The mechanical engineering department offers direct admission for *truly exceptional* students to its PhD program. Applicants must have consistent and exceptional credentials throughout all their academic career — including:

- A program GPA equivalent of 3.500/4.000 or higher in an undergraduate mechanical or closely related engineering program.
- GRE scores of 310 or greater in Verbal and Quantitative skills and 3.5 in Analytical Writing.
- Documentation of undergraduate research experience as provided by supervising faculty.

All other application requirements of the PhD program, such as a statement of purpose, research papers published, and two professional reference letters apply.

<sup>1</sup> Link opens new window.

## Program Requirements

1. Course Distribution: Total credit hours = minimum of 72 credit hours.
  - a. **Graduate Coursework MS – PhD:**
    - i. Required Course (four semesters of ME Graduate Seminar).
    - ii. Mathematics and computational tool courses (minimum 6 credit hours taken exclusively during the PhD coursework and NOT from any previously earned MS degree).
    - iii. Minimum of 42 credit hours of technical electives:
      1. Up to 24 credit hours of coursework may transfer from previously earned master’s degree in mechanical engineering or closely related field as approved by the ME graduate coordinator.
      2. Maximum of 6 credit hours in coursework at the 600 level (beyond master’s level coursework).
      3. No coursework at the 500 level.
      4. Excess dissertation hours cannot be applied toward 42 credit hours of elective coursework.
    - iv. A minimum of 12 credit hours of coursework (excluding dissertation hours) beyond the MS degree, should be at the

800 level or more. No coursework credit will be given to project, thesis/dissertation, and/or independent study.

- v. Maximum 24 credit hours of dissertation.

### b. Graduate Coursework BS – PhD:

- i. Required Course (five semesters of ME Graduate Seminar).
- ii. Mathematics and computational tool courses (minimum 12 credit hours taken exclusively during the PhD coursework and NOT from any previously earned BS degree).
- iii. Minimum of 36 credit hours of technical electives:
  1. Up to 12 credit hours of graduate level coursework may transfer in ME or related disciplines as approved by the ME graduate coordinator.
  2. Maximum of 12 credit hours in coursework at the 600 level.
  3. No coursework at the 500 level.
  4. Excess dissertation hours cannot be applied toward 42 credit hours of elective coursework.
- iv. Minimum of 15 credit hours of coursework (excluding dissertation hours) must be at the 800 level or above. No coursework credit will be given to project, thesis/ dissertation, and/or independent study.
- v. Maximum 24 credit hours of dissertation.

Course	Title	Hours
<b>Mathematics and Computational Tool Courses <sup>1</sup></b>		
Select at least 6 credit hours (12 credit hours for BS to PhD) from the list below		6 (or 12)
ME 730	Modeling of Engineering Systems	
ME 749	Applications of Finite Element Methods in Mechanical Engineering	
ME 782	Engineering Applications of Computational Fluid Dynamics and Heat Transfer	
ME 870	Advanced Laser Applications in Manufacturing	
AE 722	Finite Element Analysis of Structures I	
IME 724	Statistical Methods for Engineers	
IME 754	Reliability and Maintainability Engineering	
IME 755	Design of Experiments	
MATH 700+	Three or more credit hours in mathematics courses at the 700 level or above	
STAT 700+	Three or more credit hours in statistics courses at the 700 level or above	
<b>Required Course</b>		
ME 777	Mechanical Engineering Seminar (The ME department requires its PhD candidates to take this mandatory 0 credit hour seminar course at least four semesters—five semesters for direct BS to PhD degree—during their PhD program.)	0

## Dissertation

ME 976	PhD Dissertation (Select 24 credit hours in dissertation)	24
<b>Technical Electives</b>		
Select as many related hours as necessary to satisfy the total credit hour requirements (at least 42 credit hours of graduate coursework for MS to PhD students, and 36 credit hours of graduate coursework for BS to PhD students)		42 (or 36)
<b>Total Credit Hours</b>		<b>72</b>

3. **Advisor, Advisory Committee and Plan of Study:** Before completing 12 PhD credit hours at WSU, a student must select an advisor and an advisory committee. With the help of the advisor, the student must prepare a plan of study that needs to be approved by the advisory committee, graduate coordinator and Graduate School before the comprehensive exam is attempted.
4. **Comprehensive Examination:** Students are eligible to take the comprehensive exam after completing 18 credit hours in the PhD program at WSU (not counting any MS credit hours whether earned at or transferred to WSU). This exam must be completed a semester before the student plans to defend the PhD proposal. Students who cannot pass the comprehensive exam in two attempts will be recommended for dismissal from the PhD program to the Graduate School.  
  
The exam is offered once every Fall and Spring. The student can choose to take the exam in one of the three areas: 1) thermal/fluids/energy sciences; or 2) mechanical design, control and robotics; or 3) materials engineering. Further details about the exam (including exam dates and format) may be obtained by contacting the graduate coordinator or faculty in one of the three areas listed above.
5. **Dissertation Approval Examination:** Prepare a dissertation research proposal and pass an oral examination of the proposal. A student cannot attempt the examination more than twice. A student must be continuously enrolled in ME 976 after the dissertation approval examination.
6. **Dissertation Defense:** Must pass an oral examination of the dissertation.
7. **Professional and Scholarly Integrity Training Requirement:** Must complete professional and scholarly integrity training requirement, preferably during the first semester of the program.
8. **Other Program Requirements:** All other requirements are subject to college and university guidelines.

<sup>1</sup> The mathematics and computational tool courses are **not** to be considered as the same language (tool) that the Graduate School employs and these do count towards the degree.

### **Applied Learning**

Students in the PhD in mechanical engineering program are required to complete an applied learning or research experience to graduate from this program. The requirement can be met by successfully completing research and holding a public defense of the dissertation.