

# Ph.D. in Mechanical Engineering

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The program is for superior students with master's degrees in mechanical engineering, or closely related fields, who wish to do advanced research in an area of mechanical engineering. It provides students with the skills necessary for careers in basic and applied research, as well as the intellectual foundation to provide leadership in academia and industry. In exceptional circumstances, highly qualified students with bachelor's degrees in mechanical engineering may be accepted directly into the doctoral program.

## Degree Requirements

Coursework registration requirements: Ph.D. students with a recognized Master's degree or equivalent are required to take four 700#level 3#credit courses (12 credits). Ph.D. students with a recognized Baccalaureate degree are required to take eight 600#level or 700#level 3#credit courses (24 credits) of coursework beyond the Baccalaureate degree as well as four additional 700#level 3#credit courses (12 credits), for a total of twelve 3#credit courses (36 credits). Master's project (course 700), Master's thesis (course 701), or more than two independent study courses (courses 725 and 726) cannot be used to satisfy these coursework requirements. A Ph.D. student may substitute a 600#level course for a 700#level course only after the academic advisor appeals on behalf of the student to the Office of Graduate Studies and receives approval. The program or the student's dissertation committee may ask the student to take additional courses above the aforementioned minimum requirements.

Dissertation registration requirements: Ph.D. students who pass the Qualifying Examination (QE) must then register for 3 credits of pre#doctoral research (792B) per semester until they defend successfully the dissertation proposal. Specific dissertation topics are approved by the department on an individual basis. Ph.D. students who defend the dissertation proposal successfully must then register for the 1#credit dissertation course (790A) each semester until they complete all degree requirements. Students may take courses simultaneously with the 790 or 792 course as per Ph.D. program guidelines or dissertation committee recommendation.

Program deadlines for full#time students: The required coursework for the Ph.D. program and the (major part of the) QE must be completed successfully by the end of the second year in the program. The dissertation proposal must be defended successfully either by the end of the third year in the Ph.D. program or four semesters after registering for the first time in the 792 pre#doctoral research course, whichever occurs earlier. The dissertation must be defended successfully by the end of the sixth year in the Ph.D. program.

## Qualifying Examination

Before becoming a doctoral candidate, a student must demonstrate his/her ability to integrate the knowledge acquired studies in the Qualifying Examination. The examination will evaluate the students' knowledge in selected areas of mechanical engineering, as well his/her research potential which will be based on the student's formal research prospectus submitted in written form. After receiving the research prospectus, the department will form a committee of 3 or more members to conduct an oral examination.

The formal research prospectus should contain the following information:

- Abstract: A summary of the research reported in the prospectus
- Background and Significance: (a) Demonstrate knowledge of breadth of literature underlying the reported research; (b) Identify the unsolved problems and their significance; and (c) Show the planned approach to address the problems.
- Research Work and Preliminary Results: (a) Show the theoretical development and/or the experimental design of the approach used in the research; and (b) Show the results obtained.
- Discussions and Conclusions: Discussion of the results, which may include a comparison with the expected results, if applicable, and potential problems.
- Future Work: Identify the problems that needs to be addressed if the reported research is to be continued.
- References: List of the publications cited in the background literature survey and other related reference materials.

The maximum length of formal research prospectus is 15 pages single#spaced, excluding references. Additional pages may be used as appendix only if necessary.

## Dissertation Proposal Examination

After passing the qualifying examination, Doctoral students, under the guidance of their faculty advisors, must conduct preliminary research in a specific topic and prepare a written research proposal. The dissertation topic should represent original research and reflect a student's ability to critically understand the significance of a problem. The proposal must provide approaches for developing potential solutions to the problem. Doctoral students must make an oral presentation of the dissertation topic for approval by their dissertation committees. The dissertation proposal should follow the format required for the final dissertation document.

## **Dissertation Defense**

When the novel and independent dissertation research conducted by a doctoral student produces sufficient and significant results, the student, in consultation with his/her dissertation committee, will prepare for the completion of the dissertation. An oral defense of the dissertation is required after submission of the final document to the department for approval. Signatures of all members of the dissertation committee must be received for final approval to be granted.