MECHANICAL ENGINEERING, PHD (PENDING SCHEV APPROVAL)

Banner Code: VS-PHD-ME

Note: as of catalog publication in April, the program described below has been approved by the Board of Visitors and sent to the State Council of Higher Education in Virginia for consideration as a new degree program. The university cannot accept applications or enroll students in this program until SCHEV approval has been granted.

The Mechanical Engineering PhD is designed for students who wish to pursue a career in government, private industry and/or academia that focuses on research and advanced development on topics such as next generation design of commercial and military aircraft, interplanetary spacecraft, new drug delivery systems, and nuclear and solar-based energy systems. To prepare students, the Department of Mechanical Engineering provides a curriculum which includes advanced learning in the fluid and thermal sciences, solid and continuum mechanics, electromechanical system design, control systems, and in aspects of materials science. Students in the program will typically choose a research emphasis in areas as broad as continuum mechanics, or more specific areas such as solid mechanics, fluid mechanics, thermodynamics, or heat transfer.

Admissions & Policies

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Admissions

This program seeks to attract students with backgrounds in mechanical engineering, aerospace engineering, materials science, applied physics, or other closely related fields.

The applicant must submit official transcripts, a resume, a goals statement and three letters of recommendation. A minimum undergraduate GPA of 3.25/4.0 and a minimum graduate GPA of 3.5/4.0 is expected. A Master of Science in Mechanical Engineering or a related engineering discipline is required. International students must submit additional requirements to complete a graduate studies application, to include an English proficiency exam. Application materials are reviewed by the Mechanical Engineering PhD admissions committee, which makes a recommendation to the Mechanical Engineering department chair.

Policies

For policies governing all graduate programs, see AP6 Graduate Policies (https://catalog.gmu.edu/policies/academic/graduate-policies/).

Reduction of Credit

Students must complete a minimum of 72 graduate credits, which may be reduced by a maximum of 30 credits from an approved and completed master’s degree. Reduction of credit requires the approval of the program director and the dean or designee of the school. They determine whether the credits are eligible for reduction of credit and applicable to the degree program.

Program Requirements

Mechanical Engineering doctoral candidates must earn a minimum of 72 graduate credits. The program is made up of a breadth requirement (assessed via a qualifying exam) followed by preparation of a dissertation proposal, an original research project, and final defense. To advance to candidacy, students must complete all coursework, pass the qualifying exam, and defend a dissertation proposal.

Requirements

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Degree Requirements

Total credits: 72

The degree plan outlined here is based on a student who receives a full 30 credit reduction. Students who do not receive a full credit reduction will be required to choose additional credits in consultation with their advisors.

Plan of Study

Courses that constitute a student’s plan of study should be chosen in consultation with the student’s advisor and/or dissertation committee.

The student must obtain at least 24 dissertation research credits which will typically be 1 credit of ME 990 Dissertation Topic Presentation, 1-11 credits of ME 998 Doctoral Dissertation Proposal, and a minimum of 12 credits of ME 999 Doctoral Dissertation. To fulfill the 72 graduate credit requirement, students must take an additional 18 credit hours, with at least 12 of these credits taken at the 700 level or higher. These will typically be as follows: (a) 6 credits of 600/700-level courses outside the ME department (typically physics, mathematics, etc.) (b) 6 credits of 700-level courses within the ME department in subjects within the student’s area of specialization, (c) 6 credits of 700-level courses within the ME department outside the student’s area of specialization. A cumulative GPA of 3.5 or higher is required for courses within the plan of study.

Available courses include:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>ME 620</td>
<td>Mechanical Engineering Decision Making</td>
<td>3</td>
</tr>
<tr>
<td>ME 621</td>
<td>Foundations of Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>ME 627</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME 698</td>
<td>Research Study in Selected Mechanical</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Engineering Topics</td>
<td></td>
</tr>
<tr>
<td>ME 699</td>
<td>Advanced Special Topics in Mechanical</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Engineering</td>
<td></td>
</tr>
<tr>
<td>ME 714</td>
<td>Fracture Mechanics</td>
<td>3</td>
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</table>
other people from the Mason graduate faculty. The dissertation director who must be a member of the Mason graduate faculty, and at least three

The doctoral supervisory committee includes the dissertation director, temporary advisor until they are assigned to a dissertation director and academic advisor. Students are responsible for working with the

On admission to the program, students are assigned a temporary advisor. Upon reaching a total of 18 credits, students must choose a dissertation director from the total graduate faculty. The dissertation director and chair of a PhD in Mechanical Engineering dissertation committee must have at least a 50% appointment in the Volgenau School. This rule does not apply to a co-director, provided that the chair and other co-director satisfies the “at least 50% rule.” At least three committee members must be from the Volgenau School, and at least two of the departments of the Volgenau School must be represented on this committee.

In addition, industrial representatives and faculty members from departments outside the school are highly desirable, but not required, on the committee. The doctoral supervisory committee administers the dissertation proposal presentation, and the dissertation predefense and defense.

Dissertation Proposal

Near the end of the coursework, doctoral students prepare a written dissertation proposal to present to the doctoral supervisory committee. The proposal must be delivered by hard copy to the doctoral supervisory committee at least two weeks before the presentation. Students should enroll in ME 998 Doctoral Dissertation Proposal to complete this effort (note: students must pass the qualifying exams before enrolling in ME 998). During the term the student expects to present the dissertation proposal to the committee (or perhaps the prior term), the student should enroll in ME 990 Dissertation Topic Presentation. After successfully completing the dissertation-proposal requirement, the student is formally admitted as a candidate for the PhD degree. The application for candidacy is submitted by the department on a standard form.

Dissertation and Final Defense

With the concurrence of the dissertation supervisory committee, students proceed with the doctoral research, during which time they must be continuously enrolled in ME 999 Doctoral Dissertation. When the central portions of the research have been completed to the point that students are able to describe the original contributions of the dissertation effort, they submit the written dissertation to the committee and schedule an oral predefense to the committee. The predefense is to be held no sooner than one month after the conclusion of the predefense so that the announcement is posted for the defense. If the student fails to successfully defend the dissertation, the student will be terminated from the program.

Qualifying Exams

To satisfy the breadth requirement of the PhD degree, students must pass a set of written qualifying exams designed to test fundamental knowledge. Each exam is based on an established reading list. The qualifying exams are not associated with specific courses, although some courses may help students prepare for these exams. The qualifying exams are offered twice a year just before the fall and spring semesters. Each exam is allocated two hours and graded on a pass or fail basis. Students select their exams using a request form submitted to the Mechanical Engineering department.

Students must attempt a set of four exams no later than the first opportunity following the completion of 18 credits. Each student must pass all four exams in two consecutive offerings. Four exams must be attempted in the first offering. The exams attempted on the second offering need not be the same as in the first. A student who fails to pass four qualifying exams in two consecutive semesters is subject to termination from the program.

Dissertation Research

The candidate must complete 24 research credits as follows:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ME 990</td>
<td>Dissertation Topic Presentation</td>
<td>1</td>
</tr>
<tr>
<td>ME 998</td>
<td>Doctoral Dissertation Proposal (1-11 credits)</td>
<td>1-12</td>
</tr>
<tr>
<td>ME 999</td>
<td>Doctoral Dissertation (must complete a minimum of 12 credits)</td>
<td>1-12</td>
</tr>
</tbody>
</table>

Doctoral Supervisory Committee

On admission to the program, students are assigned a temporary academic advisor. Students are responsible for working with the temporary advisor until they are assigned to a dissertation director and establish a doctoral supervisory committee.

The doctoral supervisory committee includes the dissertation director, who must be a member of the Mason graduate faculty, and at least three other people from the Mason graduate faculty. The dissertation director must be a member of the Mason graduate faculty, and at least three