E. Ph.D. Qualifying Examination

All doctoral students in the Department of Aerospace Engineering and Engineering Mechanics must pass a candidacy examination, as required by the University’s Graduate Handbook (section on Candidacy). Hereafter in this section, this exam will be referred to as the Ph.D. Qualifying Examination or the Qualifying Exam. In order to take the exam, a student must have at least a 3.25 overall GPA and at least a 3.0 GPA in his/her major area. Passing the exam is only one of the requirements for candidacy.

The Ph.D. Qualifying Examination consists of two parts: a written examination, and an oral examination to be given only after the student has passed the written examination. The objective and examination grading are based on the student’s:

1) understanding of engineering concepts and ability to apply these concepts in research and design.
2) ability to critically analyze an engineering problem
3) ability to organize and communicate a body of knowledge
4) ability to answer questions related to a defined body of knowledge.

IT IS EXPECTED THAT THE STUDENT SHOULD SHOW A THOROUGH UNDERSTANDING OF THE PHYSICAL AND MATHEMATICAL CONCEPTS UNDERLYING HIS/HER MAJOR AREA, AND SHOULD DEMONSTRATE THE ABILITY TO SUCCESSFULLY COMPLETE AND DEFEND AN ORIGINAL RESEARCH DISSERTATION.

Any Graduate student, whether holding a MS degree or not, who has declared his/her intention to pursue a Ph.D. degree is considered a Doctoral student, and as such is required to pass the Ph.D. Qualifying Examination subject to the requirements of this Section.

1. Time Requirements

The Ph.D. Qualifying Examination is given twice a year, normally near the middle of the Autumn and Spring quarters (late October and late April).

A student entering the doctoral program with a BS degree only must pass the exam no later than the third time it is offered after the quarter of his/her entrance. A student entering the doctoral program with a MS degree in an engineering discipline must pass the exam no later than the second time it is offered after the quarter of his/her entrance. A continuing student entering the Ph.D. program with a MS degree from the AsE/EM Department must pass the exam no later than the Spring Quarter of the third year of graduate study. A student entering the doctoral program with a MS degree not in an engineering discipline must pass the exam no later than the third time it is offered after the quarter of his/her entrance. A part-time doctoral student must pass the exam no later than the fourth time it is offered after his/her entrance quarter. A student may not take the Ph.D. Qualifying Exam more than two times, and may be denied a second chance to take the exam due to poor performance on the first try. A student will not be allowed a second chance if the re-take would violate the above time requirements. Failure to take the exam when required counts as failure of the exam.

In exceptional cases, the time requirements specified above may be waived upon petition to the Graduate Committee (see Section 2 below).
The table below summarizes when a student must pass the exam (P) and when he/she would have to take it the first time (1) in order to be eligible for a retake.

<table>
<thead>
<tr>
<th>Number of times the exam has been offered after the entrance quarter</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<td>P</td>
<td></td>
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<td>P</td>
<td></td>
<td></td>
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<tr>
<td>MS from AsE/EM continuing to PhD</td>
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<td></td>
<td>1</td>
<td></td>
<td>P’</td>
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<td></td>
<td></td>
<td>1</td>
<td>P</td>
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* - Within three years of entering graduate study in AsE/EM

2. **Petition Requirements**

A student wishing to depart from the time requirements above must notify the Dept. Graduate Committee by petition of his/her intentions. This written petition, detailing the reasons for the departure, must be received and approved prior to the scheduled exam.

A student wishing to take the Qualifying Exam in the Fall or Spring quarter must notify the Dept. Graduate Office, by the form provided by that office, of his/her intention to take the exam before the posted deadline for applying for that quarter’s exam - generally about three weeks before the exam date. On the form, the student must indicate his/her major area and must secure the signature of a faculty member who has agreed to act as the student’s dissertation advisor should the student pass the exam.

Approved AsE/EM major areas of study are: Dynamics and Controls, Fluid Mechanics, Propulsion, and Solids and Structures.

3. **Special requirement for foreign students**

Foreign students subject to TOEFL requirements are strongly urged to pass the Oral English Proficiency exam before taking the Ph.D. Qualifying Examination because of the language skills required for the oral portions of the exam.

4. **The Ph.D. Qualifying Examination**

All students who apply for the PhD Qualifying Examination will have access to prior exam questions (but not necessarily to solutions) from at least the prior two years. Each major area provides to the Graduate Office a list of Qualifying Exam topics that the exam can cover. These topic lists are maintained by the faculty in each of the major areas. The Graduate
Office will provide the latest topic list available from the group.

The exam shall consist of a written part and an oral part. The oral examination is taken only if a passing grade is achieved on the written part.

a. Written Exam

The written examination is a four-hour, closed book exam that consists of four questions, with three questions in the major area of study, and one question in mathematics relevant to the major area of study. All of the questions will be prepared and graded by the faculty members in the major area of study. A passing grade on at least three of the four questions is required to pass the written part of the qualifying examination. For any question that is failed, the faculty member grading the question will provide to the Graduate Office a written justification for the failing grade.

b. Oral Exam

Prior to the written examination, the student will meet with his/her potential dissertation advisor to define a specific topic in the student’s major area of interest and to identify appropriate source material for an oral examination. This material will consist of seminal literature from books, journal articles, and conference proceedings that are related to the student’s major area of study and to the student’s intended doctoral research area. (This was altered in 1999.)

Following passage of the written examination, the student will prepare for the oral seminar and examination. The student must schedule the oral exam as described below under “Procedure.”

The student will first distribute a double-spaced, typed review of the literature to be presented in the oral seminar. Copies of this review should be given to the faculty members of the major area of study and to the Graduate Office at least one week before the seminar. This review should be a maximum of 10 pages long with a maximum of 5 references and a minimum font size of 12 points. The written review must:

1. highlight the key concepts of the material,
2. critically assess the major technical contributions and applications, and
3. explain the significance to the major field of study.

The student can confer with faculty members during the preparation of this document, however the document must not be edited by any faculty member.

At the oral exam, the student will present an uninterrupted seminar open to all faculty and students, lasting at least 20 minutes but no longer than 30 minutes. This will be followed by a question and answer period, typically lasting 30 - 60 minutes, open only to the Dept. faculty plus any designated persons from outside the Dept. faculty for whom the faculty present indicate no objections. (Outside persons allowed starting in 2000.) Questions on the source material, engineering fundamentals, and topics broadly related to the source material and the major area will be allowed. (Preceding sentence altered in 1999.)

Upon completion of the seminar and oral examination, all Dept. faculty members present at the seminar will vote on the outcome of the examination using the criteria at the beginning of the section on the Ph.D. Qualifying Exam. (Preceding sentence changed in 2000.) A majority passing vote (not a tie) is required to pass. The oral examination will be given once, unless the examiners, by majority vote, recommend a second and final oral presentation. If a second oral examination is recommended, it must be completed before the end of the following quarter. The examiners, by majority vote, may also require the
student to retake the written examination. (Following altered in 2002:) A student who
does not pass the oral examination will not be denied a chance to re-take the exam,
subject to the time limitations of Section 1 above.

c. Procedure

An application to take the Ph.D. Qualifying Examination must be completed and returned
to the Graduate Office no later than the posted deadline for the exam, which will be
approximately three weeks before the date of the written examination. The seminar topic
must be defined by the student and his/her potential faculty dissertation advisor, and
included on the application. (The requirement that material be assigned prior to the exam
waived in 2002.)

The seminar must be scheduled by the student, must be registered with the Graduate
Office no later than two weeks after notification of having passed the written
examination, and must be completed by the end of the quarter. The notification to the
Graduate Office must include an indication, by a faculty sign-off sheet or by e-mail
messages to the Graduate Director and Graduate Coordinator, that the scheduled time for
the seminar is acceptable to at least a majority of the faculty members in the major area of
study. A written seminar announcement must be distributed to all members of the
faculty, stating the time and place of the presentation, at least one week before the
scheduled date.

All Dept. faculty members in the student’s major area of study are expected to be present
at the oral examination. However, all members of the Dept. faculty are welcome, as are
other persons to whom the faculty members present have no objections. A minimum of
three Dept. faculty members must be present. (This paragraph altered in 2000 and 2001.)

Failure of the student to meet any of the requirements presented in this section is
justification for failure of the Ph.D. Qualifying Examination.

d. Change of Major Area

If a student changes major area of study, the entire Ph.D. examination must be repeated.

e. Right to Review Failed Questions

The following information regarding a student’s performance on the Qualifying Exam
shall become part of the student’s departmental file, and as such will be available for
review upon request to the Director of Graduate Studies:

   The four (or fewer) grades received on the written exam questions.
   The written justification for any failing grade, if applicable.

In addition, for a period of three weeks after the date of notification of the results of the
exam, a student who failed a question, either written or oral, may request a meeting, at a
mutually acceptable time, with the appropriate faculty member to discuss the question
that was failed. If this is a written exam question, a photocopy of the graded question
will be provided to the faculty member for this discussion. The exam books will be
destroyed after this three week period plus any period required for the meeting, but
no longer than the end of the quarter. (This paragraph altered in 2001.)