RBE PhD Student Online Handbook

This document is a supplement to the information contained in the Graduate Catalog. Together, this document and the Graduate Catalog specify the regulations of the Robotics Engineering Doctoral Program. It is the student’s responsibility to become familiar with and follow the specified regulations.

Each student is assigned an academic advisor when enrolled into the RBE doctoral program. Any questions regarding the regulations of the Robotics Engineering Doctoral Program should be discussed with the academic advisor. Students have the option of changing their academic advisor with the agreement of the new advisor and coordination with the program Graduate Secretary.

Doctoral Credit Requirements

The Robotics Engineering doctoral program requires 60 credit hours of work beyond an M.S. degree or 90 credit hours beyond a B.S. degree. Coursework must include 3 credit hours of Management or Systems Engineering courses at the 500 level or above. This requirement may be satisfied as part of the M.S. in Robotics Engineering or other M.S. program. All entering students must submit a plan of study identifying the courses to be taken and a prospective research area before completing more than 9 graduate credits. The plan of study must be approved by the student’s academic advisor and submitted to the RBE Graduate Program Committee, and must include the following minimum requirements.

For students entering with an M.S., the 60 credits shall be distributed as follows:

1. Graduate coursework, including Special Topics and Independent Study (12 credits). If not already included in the M.S. degree, the credits must include 3 credit hours of Management courses at the 500 level or above, or 3 credit hours of Systems Engineering courses at the 500 level or above.
2. RBE 699 Dissertation Research (30 credits).
3. Other. Additional graduate coursework, Independent Study, RBE 598 Directed Research or RBE 699 Dissertation Research (18 credits).

For students entering with a B.S., the 90 credits shall be distributed as follows:

1. RBE M.S. Degree Requirements (30 credits).
2. Graduate coursework, including Special Topics and Independent Study (12 credits).
3. RBE 699 Dissertation Research (30 credits).
4. Other. Additional graduate coursework, Independent Study, RBE 598 Directed Research or RBE 699 Dissertation Research (18 credits).

Summary of Credit Requirements

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<td>M.S. Degree Requirements</td>
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<td>Coursework</td>
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<td>Additional Courses/Research</td>
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<td>Dissertation</td>
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Doctoral Qualifiers

The Doctoral Qualifiers evaluates each student’s level of academic preparation. The Doctoral Qualifiers consist of four topic qualifiers: Technical, Writing, Speaking, and Research. Doctoral students must successfully complete the Doctoral Qualifiers before 1) completing 30 credits towards the Ph.D. for students entering with a M.S., or 60 credits towards the Ph.D. for students entering with a B.S., and 2) before completing 18 credits of directed research.
Upon successful completion of the Doctoral Qualifiers, the doctoral student advances to Ph.D. candidacy. Upon failing any topic qualifier, the student may retake the failed topic qualifier one additional time. Failing any topic qualifier twice results in the dismissal from the Robotics Engineering doctoral program. However, students can petition the RBE Graduate Program Committee to review their case. After reviewing the case, the committee can decide to let the student take the qualifier one additional time.

**Technical Qualifier**

The technical qualifier ensures sufficient background in the core areas of robotics engineering. Students may demonstrate proficiency in robotics engineering by completing the foundational courses, or equivalent – *RBE 500 Foundations of Robotics, RBE/ME 501 Robot Dynamics* and *RBE 502 Robot Control*. Technical qualification in one or more of these areas can also be achieved by taking the final written exam for a given course, which is then evaluated with a letter grade. Passing the technical qualifier is achieved with a grade distribution of two A’s and a B, or better.

**Writing Qualifier**

The writing qualifier evaluates written communication skills. The student must write a 6 to 8 page scholarly document as the sole or primary author (if co-authored). The quality of the scholarly document must be worthy of external, peer review. The RBE Graduate Program Committee will select two or more faculty members, at least one of which must be affiliated with the RBE program, to evaluate the scholarly document. Co-authors must be approved by the evaluators and cannot include an evaluator. The student’s advisor cannot be an evaluator.

The evaluation of the Writing Qualifier will be based on the technical correctness of the document, referencing of pertinent and recent publications, organization of the document, clarity of the writing, and ability to convey the completed work to a reader with basic knowledge of the area. Evaluators will use the Writing Review Form to evaluate the student’s writing and provide feedback.

**Speaking Qualifier**

The speaking qualifier evaluates verbal communication skills. The student shall give a public technical talk at WPI, accessible to a general audience, on a topic that is directly related to robotics engineering. The RBE Graduate Program Committee will select two or more faculty members, at least one of which must be affiliated with the RBE program, to evaluate the public technical talk. The student’s advisor cannot be an evaluator. The talk must be scheduled such that all evaluators are able to attend and at least one week of advanced advertisement to the WPI community is provided. The evaluation of the Speaking Qualifier is based on the effectiveness of the student to verbally explain the topic at hand. Evaluators will use the Speaking Review Form to evaluate the student’s speaking skills and provide feedback.

WPI provides multiple opportunities for students to practice their speaking skills. In addition to individual research group meetings, research area seminars also provide venues for public speaking (e.g. HRI, AIRG, ISRG, etc). It is recommended that students make their presentation as part of a regular meeting of one of these groups, though scheduling a special time and date is also acceptable.

**Research Qualifier**

The research qualifier evaluates the ability to conduct research. The student must register for one semester comprising of at least three credits of Directed Research (RBE 598) with an RBE affiliated faculty acting as the Research Advisor. At the end of the semester, the Research Advisor will evaluate the research work, independent of the final grade assigned for the directed research credit. Reattempts may be taken with a different Research Advisor.
The above qualifiers are designed to ensure that students not only have sufficient knowledge of their field, but also the abilities to perform research and communicate technical ideas with clarity. It is expected that multiple qualifiers can be completed with a single project. For example, a student may perform a research qualifier with a faculty member and use the outcome of that research to complete the speaking and writing qualifiers. The flowchart below summarizes a student’s expected progress through the program milestones.

Questions regarding the RBE PhD program requirements should be directed to the Graduate Program Committee, rbe-gpc@wpi.edu.