Doctoral Program Requirements

To earn a Ph.D. degree, both Institute and Department requirements must be met. Listed below are the minimum requirements and associated deadlines. Both full-time and part-time students must adhere to these requirements.

In addition to these requirements, you should be familiar with the information in the Rensselaer Catalog and the Institute Graduate Tuition Policy in order to plan out your Ph.D. study appropriately.

The Doctor of Philosophy (Ph.D.) degree is awarded from the department and represents the culmination of a significant amount of work, imagination, and perseverance by you. The degree is earned once your thesis advisor and doctoral committee agree that you have demonstrated independent thought and research, made original contributions to the fundamental knowledge in a given field, and have produced a substantial body of information in the form of a dissertation publishable in a refereed journal(s). The dissertation documents your research and is expected to be a scholarly work.

I. Institute Requirements

• You must complete seventy-two (72) credit hours past the B.S. degree, or complete forty-eight (48) credit hours past the Master's degree earned elsewhere.

• You must complete forty-eight (48) credit hours of thesis and/or course work at Rensselaer. This is a residency requirement*.

• The minimum average of all grades used for credit toward an advanced degree must be B.

• You must present an independent thesis that demonstrates creativity, originality, and scholarly thought.

• You must acquire a thesis advisor, form a Doctoral Committee, submit a Graduate Plan of Study, pass a Candidacy Exam, and defend the thesis.

• If you are a full-time student, you must complete all the above requirements within three (3) calendar years after admission to the candidacy exam and within seven (7) years of beginning Ph.D. studies. If you are entering with a Master's degree in your field of study you must finish all degree requirements for the Ph.D. within five (5) years. Degree candidates must have either: maintained full-time registration, maintained continuous full-time registration following a change of status from part-time to full-time, or have been, at all times, a part-time student. Under no circumstances will a full-time student be allowed to transfer to part-time status and maintain eligibility for graduation.
• Submit the electronic copy of your dissertation via UMI/ProQuest's ETD Administrator website in PDF format. The thesis submitted must already have been approved by your Committee. You will need to use a credit or debit card to pay a $27.00 fee as part of the UMI ETD Administrator submission process. This fee covers the cost of UMI/ProQuest supplying a bound paper copy of your dissertation to the Rensselaer Libraries for preservation. Please note that you may file for copyright registration via UMI/ProQuest for an additional $55.

• File a degree application with the Registrar's Office by the date specified in the academic calendar for the semester in which you plan to graduate. If a degree application was filed the previous semester, but the requirements were not fulfilled, a new degree application must be filed for the semester in which you actually graduated.

*Note, for students commencing their doctoral studies prior to Summer 2008, the Institute requirements are ninety (90) credits past the B.S. degree or sixty (60) credits past the master's degree, with a residency requirement of forty-five (45) credit hours at Rensselaer.

II. Department Requirements

• Declare and Be Admitted for Ph.D. Study

When admitted with a B.S. degree, you must declare intention and be admitted to study for the Ph.D. degree by the time the Master's degree is awarded, but no later than four semesters after being admitted to the graduate school.

When admitted with a Master's degree, your admission is into the Ph.D. program and no further action is needed.

• Choose a Dissertation Advisor

Your thesis advisor will guide you in all aspects of your academic and research programs. Your thesis advisor is usually from the MANE department but can be from a different department. If you choose to do a dissertation with an advisor from another department, then a doctoral committee co-chair from within the MANE department is required. This must be done within fifteen (15) credit hours completed in the Ph.D. program, but not later than the end of the second semester after being admitted for Ph.D. study.
• File a Graduate Plan of Study

A Graduate Plan of Study lists all the courses and thesis credits you will use to complete your Ph.D. degree requirements, and must be prepared and submitted to the Graduate Program Director for his/her review and signature. Courses are determined by the needs of the student’s research with the guidance of the thesis advisor.

A minimum of twelve (12) credits of course work beyond that required by the Master's degree must be completed. Of these minimum twelve (12) credits of course work: up to three (3) credits of an Individual Project / Independent Study course may be used. Note: Individual Project / Independent Study credits may not be taken with the student’s research advisor. At least half of the twelve minimum credits of course work must have the MANE prefix. Credits of non-MANE prefix (electives) are limited to Engineering or Science courses of a technical nature; all of these electives must be taken at the 6000-level, with the exception of up to one 4000-level course. No courses used to complete undergraduate degree requirements may also be counted towards the completion of a graduate degree.

This Graduate Plan of Study is preferably submitted by the start of the second semester in the Ph.D. program, but must be submitted no later than the end of the third semester after being admitted for Ph.D. study. A revised Plan of Study is required when courses listed on the original are not offered or more appropriate courses need to be completed.

*Each full-time student must register each semester for Graduate Seminar MANE-6900 and attend the required number of seminars.

• Take the Department Qualifying Exam (DQE)

After you are admitted to the doctoral program, you must pass an oral Department Qualifying Exam (DQE) to be advanced to doctoral student status. The purpose of the DQE is to evaluate the intangible factors essential for a successful Ph.D. that coursework does not show. You will be questioned to determine if you have the capability to think, synthesize information, speculate based on background knowledge, demonstrate more than textbook problem-solving skills, and convey your thoughts and ideas clearly to others.

No more than one full semester beyond Master's degree completion may pass before taking the DQE, or thirty (30) credit hours of graduate work if no Master's degree is sought. Specifically, if you finish your Master's degree in the Spring or Summer (or 30 credit hours) you will take the exam at the beginning of the following Spring semester, and if you complete your Master's degree (or 30 credits) in the Fall, you will take the exam the following Fall term. If you are entering with a Master's degree, you will take the exam at the beginning of your second semester at Rensselaer. This applies to both full-time and part-time students. If the DQE is not taken within the time limit, then you will be given a failing grade. To be
permitted to take the exam, you must have earned a minimum grade point average of 3.33 (B+) based on the courses taken in a Master’s degree program or from an equivalent number of courses if a Master’s degree was not earned.

The exam will be administered at the beginning of the Fall and Spring semesters during the first two weeks of classes. Three faculty members (thesis advisor is excluded) will question you for approximately one (1) hour in two areas, primary and secondary, of your choice from a list of areas. Relevant applied mathematics questions will be included. The areas to choose from are:

- Controls
- Fluid Mechanics
- Heat Transfer & Thermodynamics
- Flight Mechanics & Aerodynamics
- Design
- Engineering Computation
- Dynamics
- Nuclear Radiation
- Manufacturing
- Reactor Engineering & Physics
- Solid Mechanics

Sample questions and information about potential topics are available in the MANE Graduate Student Services Office (JEC 2002). You will be notified of the examiners at least ten weeks before the exam. Prior to the exam, you are encouraged to meet with examining committee members to discuss appropriate subjects on which you may be quizzed. Questions will be at the first-year graduate-student level.

After all the DQEs have been given for a semester, examiners will meet to discuss the results and determine the outcome. You will be notified shortly thereafter.

*Note that inability to answer a question due to language difficulties could be treated as an inability to answer due to technical deficiencies.*

The possible outcomes of the DQE are:

- You receive an unconditional pass.
- You receive a conditional pass and upon completion of the condition, you will be advanced to doctoral student status (e.g., taking a specific course or courses).
- You fail one or both areas, but you're allowed to retake the exam one time (no more than one re-take will be allowed).
• You fail and must leave the PhD program (in this case, you may choose to obtain a Master's degree instead, if you do not already have a Master's degree from RPI, and provided your performance is at a satisfactory level for a Master's degree).

• Form a Doctoral Committee

The committee composition is determined through consultations between you and your thesis advisor. The committee is composed of a minimum of four full-time tenure-track faculty (thesis advisor is the committee chair plus three other members) and at least three Department faculty members must be on the committee (advisor from the program faculty and also two members from the program faculty); one member must be from outside the Department. Members from outside the Institute are acceptable if approved by the Graduate Program Director; these members would be in addition to the four full-time tenure-track faculty. This must be done within twenty-seven (27) credit hours completed in the Ph.D. program but no later than the end of the third semester after being admitted for Ph.D. study.

• Take the Candidacy Exam

The Candidacy Exam is focused on your doctoral dissertation research proposal. You will present your proposal in sufficient detail, in writing before the exam (so the committee can study it) and orally during the exam, so that the doctoral committee can assess your progress, goals, future research plans, and investigation rigor. Note that the text of the written research proposal (not including subsequent references, figures and tables sections) may not exceed 15 single-spaced pages. Additionally, note that during the oral exam, whose audience is limited to the committee members, you must be able to respond well in English against potentially aggressive questioning. In addition to assessing passage of the exam, the committee can recommend alternative approaches, suggest modifications to goals and tasks, require you to take additional courses, or provide other guidance to you. This Candidacy Exam must be taken within two years of passing the Department Qualifying Exam. Furthermore, the Candidacy Exam must be passed at least six months prior to the subsequent Dissertation Defense.

• Defend the Dissertation

You must prepare a written thesis and present a public seminar defending your thesis before your Doctoral Committee. After the public session is over, the Doctoral Committee will examine and discuss your thesis with you in private. The committee can accept, reject, or ask for changes in your thesis. Note that you must be able to defend well in English against potentially aggressive questioning.

This is done when you and your thesis advisor agree it is time, but must be done within seven years of being admitted for Ph.D. study, or within five years if entering with a Master’s degree. Furthermore, it is suggested that you have a minimum of at least one paper on your thesis topic accepted for publication prior to your defense.
III. Transfer Students

If you transfer from another doctoral program, you still must adhere to the above requirements. According to the Institute residency requirements, up to twenty-four (24) credit hours of your prior graduate study can be applied to the seventy-two (72) credit hours required for the Ph.D. degree. Often these twenty-four (24) credit hours include credit hours for a Master’s degree at a different university.

IV. Waivers

The Graduate Program Director, in consultation with the Department Chair and the thesis advisor, may grant you a waiver to these requirements in very unusual and limited circumstances. The waiver request must be in writing and signed by you and your thesis advisor. The waiver must be submitted prior to contravention of these regulations.

V. Enforcement

If you're not in compliance with these requirements you'll be subject to receiving a warning from the Graduate Program Director. You will have one semester to make satisfactory arrangements (in consultation with the Graduate Program Director) to come back into compliance. If you do not make these arrangements, then you will be prevented from registering the following semester and subject to losing your Ph.D. status.

VI. Representative Time Line

1. Declare and be admitted for Ph.D. study Start
2. Choose a thesis advisor Preferably by end of 1st semester, no later than end of 2nd semester
3. File a Graduate Plan of Study Preferably by start of 2nd semester, no later than end of 3rd semester
4. Take the Oral Department Qualifying Exam At start of 2nd semester
5. Form a Doctoral Committee By end of 3rd semester
6. Take the Doctoral Candidacy Exam Within two years of passing the Department Qualifying Exam
7. Defend your Dissertation
8. When advisor, committee, and you agree (within five years of completing Master’s or equivalent)
VII. Graduate Seminar:

Each full-time student must register each semester for Graduate Seminar MANE-6900 and attend the required number of seminars. This degree is awarded under the auspices of the Office of Graduate Education when the thesis is directed toward making an original contribution to fundamental knowledge in a particular field or in an interdisciplinary field. A dissertation that is scholarly, creative, original, and publishable may also deal with the relation of a discipline to educational problems and objectives within the field.