

## Students who pass School of Systems and Enterprises Program Handbook for Current Ph.D. Students

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### 1. Doctoral Programs Overview

The programs leading to the Doctor of Philosophy (Ph.D.) degree in the School of Systems and Enterprises are designed to develop students' abilities to perform research in systems engineering, socio-technical systems, and/or engineering management.

- The Ph.D. degree program in **systems engineering** is designed to develop the ability of the student to perform high-impact research and high-level design that will contribute significantly to the advancement and growth of the field of systems engineering.
- The Ph.D. degree program in **engineering management** trains students to become successful researchers, practitioners and educators in the management of engineering and technology.
- The Ph.D. degree program in **socio-technical systems** trains students to understand and develop solutions for problems involving systems and enterprises that are socio-technical in nature (e.g., including the human element in understanding the qualitative and quantitative process of evolving the enterprise/system).

### 2. Role of Doctoral Advisor and Doctoral Dissertation Advisory Committee (DAC)

Upon acceptance into the doctoral program, each student will be assigned a doctoral advisor based on their stated research interest from their statement of purpose. The doctoral advisor serves the dual role of academic and research advisor with the purpose of getting students started with their program of study and doctoral research, and guiding their academic and research progress throughout the degree program. The doctoral advisor also serves as the chair or co-chair of the Doctoral Advisory Committee (DAC) and must be a tenured or tenure-

track faculty member, a professor emeritus, or an approved faculty member within SSE. A student can request a change of advisor by submitting a petition to the chair of the SSE Ph.D. Program Committee detailing the reasons for the request, along with the endorsement of the new advisor. For such a request to be granted, it must be approved by the chair of the SSE Ph.D. Program Committee, the dean of SSE, and the dean of Graduate Academics (or their equivalent).

A Doctoral Dissertation Advisory Committee (DAC) is a body of 4-5 faculty members or other highly qualified experts in the research area that will participate in the review processes of a student's research milestones, including the Qualifying Exam, Proposal Defense, and Dissertation. A DAC is composed of at least four members, with one member serving as the doctoral advisor and chair. One member of the DAC must be a Stevens faculty member from another division or department outside the student's program of study. It is permissible and desirable to have a highly qualified person from outside Stevens as a committee member. It is strongly recommended that at least three of the DAC members are Stevens faculty. A minimum of three DAC members must have Ph.D. degrees. All members of the DAC who do not have a Ph.D. degree must be approved by the chair of the SSE Ph.D. Program Committee and the dean of SSE.

Prior to the qualifying exam, the doctoral advisor and doctoral student will nominate the members of the DAC. It should be noted that this committee could change as students' research evolves until the proposal defense. The Stevens professor from another department or program outside of SSE is not required for the qualifying exam. Students are encouraged to meet individually with the members of their DAC prior to their proposal and thesis defenses, or at the recommendation of their doctoral advisor.

Students must formally submit their DAC nominations by submitting a request in Workday. Steps on how to create a request in Workday Student can be found [here](#). In Step 3, under Request Type, select the Doctoral Dissertation Advisory Committee.

### **3. Doctoral Program Requirements**

The following is a summary of doctoral degree requirements in the School of Systems and Enterprises:

Course & Research Work: 84 credits of graduate work in an approved program of study beyond the bachelor's degree, consisting of:

- A maximum of 30 credit hours obtained in a master's program
- Completion of 24 credit hours of SSE core course requirements
- Completion of 3-credit Stevens Doctoral Signature Course (PRV 961)
- A minimum of 15 credit hours of dissertation work (SYS/EM 960)
- A minimum of 12 credits of additional graduate coursework or dissertation work (beyond the course and dissertation work requirements above).

Milestones:

- Written and Oral Qualifying Examination
- Dissertation Proposal Defense (also called Preliminary Examination)
- Dissertation Defense (also called Final Examination)

Course credits used for a degree requirement cannot be used to meet the requirements of another degree. Students who took the required courses and used them for their master's degree requirements at Stevens must substitute these courses with other relevant courses with the approval of their advisor and the SSE PhD Program Committee chair.

All doctoral students must successfully complete the Stevens Institute 3-credit signature course, PRV 961. Non-resident, part-time doctoral candidates may receive a waiver for PRV 961 with the approval of the SSE Ph.D. Program Committee chair and the dean of Graduate Academics. The waiver process includes a written statement and presentation by the candidate to the PRV 961 instructor to affirm their capabilities in the PRV 961 course area. Note that no credits are awarded with the waiver of PRV 961.

A prior master's degree earned at another institution may be transferred for up to 30 credits with approval of the faculty advisor and the dean of Graduate Academics, bringing the minimum number of credits that must be completed at Stevens down to 54. As many as 18 graduate course credits may be transferred. Transferring up to 9 credits requires only the approval of the advisor and transferring more than 9 credits requires both the approval of the advisor and the Senior Vice Provost of Graduate Education. These additional credits beyond the master's degree may not have been already applied toward any other degree. A grade of "B" or higher (3.0) is required for such courses. (A grade of B- is not acceptable.) No credits may be transferred toward dissertation research.

The advisors may request a waiver for the qualifying exam from the SSE graduate curriculum committee (GCC) if the student has completed the qualifying exam at another institution. If SSE GCC approves, this request will be reviewed at an institute-level GCC meeting as an "Information Item" at that meeting.

### **a. Core Course Requirements**

To ensure that every student has the skills to be successful in their chosen field, to ensure consistency in skillset standards, and to provide a common experience among students, there are several core courses requirements, as follows:

- Course Specific - Core Courses required for all SSE doctorate degrees
  - SYS684 Systems Thinking
  - SYS710 Research Methods
- Area Specific - Selection of two (2) quantitative courses from the following areas (other courses may be accepted based on the approval of the advisor and the SSE PhD Program Committee chair):

- EM605 Elements of Operations Research
- SYS611 Systems Modeling and Simulation
- SYS645 Design for Reliability, Maintainability, and Supportability
- SYS660 Decision and Risk Analysis
- SYS670 Forecasting and Demand Modeling Systems
- SYS681 Dynamic Modeling of Systems and Enterprise
- EM600 Engineering Economics and Cost Analysis
- EM622 Data Analysis and Visualization Techniques for Decision-making
- EM624 Informatics for Engineering Management
- SSW625 Artificial Intelligence for Software Engineering

- Domain Specific - Selection of three (3) courses from degree domain with advisor approval. These courses must be from SSE with SYS, EM or SSW prefix and should be closely related to the program of study of the student.

- Domain Non-Specific - Selection of one (1) course from any domain with advisor approval. This course can be from any program or school that is relevant to the student's PhD topic. It is recommended that the core course requirements are completed before the student enrolls in any elective courses.

Students may opt to take an independent project course (SYS 801) to fulfill some of their graduate coursework requirements with approval from their doctoral advisor. This course is typically conducted as a one-on-one investigation of a topic of particular interest between a faculty member and a student. The course is often used to explore topical areas that can serve as a dissertation. A student may take up to two special problems courses in a doctoral degree program, typically before the qualifying exam. A technical report is required as the final product for this course.

SYS960 and EM960 are research courses that give students credit for dissertation work. Students must register for the version of 960 with the course prefix (SYS or EM) that corresponds to their program. Students who are enrolled in the socio-technical systems PhD program must register for SYS960. Students are permitted to enroll in a maximum of nine dissertation credits (SYS960, EM 960) prior to taking the qualifying examination, with permission from their advisor. However, there is an associated risk in taking the maximum allowed dissertation credits prior to passing the qualification exam, as these SYS960 credits are pass/fail credits. If the student does not pass the qualification exam, these credits cannot be counted toward another degree. Careful consideration and discussion with the doctoral advisor must be undertaken before taking the allowed number of dissertation credits and before taking the qualifying examination.

## **b. Qualifying Exam**

The purpose of the qualifying examination is to assess the candidate's ability to conduct independent, high-quality research, communicate effectively, develop original ideas in their chosen area of research interest, and to examine the student's knowledge of relevant

fundamental topics in the areas of systems engineering, engineering management, and/or socio-technical systems. The candidate should develop an original research paper worthy of submission to a top-tier academic conference or journal. Students are expected to start working on the paper under their doctoral advisor's guidance as soon as they enter the program.

### **Timeline of Qualifying Exam**

Students may not schedule the qualifying examination until they have completed their two Course Specific, two Area Specific and one Domain Specific courses (a total of five courses). Students may request a waiver of these requirements, which requires the approval of their advisor and the SSE Ph.D. Program Committee chair. At the time of scheduling their qualification exam, the student should have a minimum 3.5 cumulative GPA in their course of study as part of the doctoral program. If they do not, they will have to defer the exam until they raise their GPA up to a minimum of 3.5. If they cannot achieve this within the allotted number of course credits for a Ph.D., they will be dismissed from the doctoral program.

The first attempt for the Qualifying Exam must take place by the end of the third academic semester of enrollment for all full-time students who enter with a master's degree, or at the end of the second year of enrollment for all full-time students who did enter the program without a master's degree, and all part-time students. Timing will be determined by the advisor. Failure to take the qualifying exam for the first time within this timeframe will result in the student's dismissal from the program. A petition to waive the five-course requirement, GPA requirement, or timeline requirement may be filed by the student and must be approved by their doctoral advisor and the SSE Ph.D. Program Committee chair.

If performance on the Qualifying Exam is unsatisfactory, the student has the following two choices: 1) complete the requirements for a master's degree and exit the doctoral program or 2) retake the exam within one full semester after the initial failure. Students failing the examination twice will be dismissed from the doctoral program.

Students must be registered during the semester in which the qualifying examination is taken.

### **Structure of Qualifying Exam**

The qualifying exam consists of written and oral portions, both of which are administered and evaluated by the student's Doctoral Advisory Committee (DAC). It should be noted that the Stevens professor from another division or department outside of SSE is recommended, but not required, for the qualifying exam.

For the written part of the qualifying exam, students must prepare an original research paper demonstrating their ability to conduct research on a problem relevant to systems engineering, engineering management, and/or socio-technical systems. The paper should be fewer than 5,000 words in length. The paper can, but does not have to be, an extension of a term paper from one of the SSE core classes. Students are expected to seek the supervision of their advisor in preparation of their research paper. The research paper must consist of all elements of a coherent scientific research paper, including motivation, literature review, methods, results,

discussion and conclusion. The paper must be on research conducted at Stevens during their enrollment in the doctoral program.

The oral part of the qualifying exam will be scheduled by the advisor and evaluated by the student's Doctoral Advisory Committee (DAC) upon the submission and the review of the paper. The oral exam is scheduled to be 90 minutes, during which the student makes a 20-minute oral presentation of the research work. Students will receive questions and feedback on the paper itself as well as questions on the fundamental topics in the areas of systems engineering, engineering management, and/or socio-technical systems.

To pass the Qualifying Exam, a doctoral candidate must receive a favorable vote from a majority of their DAC members, with at most a single negative vote. A doctoral candidate has completed all course requirements and passed all of their qualifying exams.

Students should notify Jessica Rosa in the SSE Center for Student Success ([jrosa@stevens.edu](mailto:jrosa@stevens.edu)) of their scheduled QE date. She will fill out the Qualifying Exam Report form on your behalf, obtain the signatures from your DAC, and submit the form to Graduate Academics through Workday.

### **c. Proposal Defense**

A student pursuing a doctoral degree should demonstrate the ability to conduct high-quality, original and creative research. The writing style, grammar and spelling of the proposal and dissertation should reflect a high level of written communication skills. The purpose of the Proposal Defense is to ensure that the dissertation is appropriately scoped, and all members of the DAC are in agreement with the methodology, products, validation approach, results, etc., for the dissertation. This proposal should show that the research results could be publishable in a refereed journal.

Every doctoral candidate is required to prepare a research proposal that addresses the following seven areas:

- 1) Describes the research content and why it is important
- 2) Presents a literature review to demonstrate what others have done in the area
- 3) Discusses the research outcome(s) anticipated including its relationship to related published research
- 4) Proposes a research validation approach
- 5) Articulates the specific contributions to the field of endeavor
- 6) Articulates the creative content and uniqueness of the research effort
- 7) Describes anticipated obstacles

The candidate must clearly articulate to their DAC why and how they propose to accomplish this research. This proposal must be in a written form and formally presented to the candidate's DAC. As a minimum, the candidate should have a problem statement, literature review, description of the approach, emerging results, validation and verification plan, schedule for

completing the dissertation, content and target journals to publish the results of the research, along with a schedule for their publication. Additionally, the candidate should have at least one paper accepted for publication in a peer-reviewed journal that is derived from the research related to the proposal. The Proposal Defense should take place after the student has completed at least 15 research credits (SYS 960 or EM 960). Typically, for a full-time student the Proposal Defense should take place 12-18 months after completion of the Qualifying Exam.

The Proposal Defense document must be made available to the Doctoral Advisory Committee at least two weeks before the scheduled event. To pass the Proposal Defense, a candidate must receive a favorable vote from a majority of the DAC, with at most a single negative vote. Feedback on the Proposal Defense will be given to the student by their doctoral advisor within seven days of its completion. If the student does not pass the Proposal Defense, they have the options to complete the requirements for a master's degree and exit the doctoral program or schedule a second defense within one semester while remedying deficiencies noted in the defense. Students failing the defense twice will be dismissed from the doctoral program.

Students should notify Jessica Rosa in the SSE Center for Student Success ([jrosa@stevens.edu](mailto:jrosa@stevens.edu)) of their scheduled proposal defense date. She will fill out the Proposal Defense Report form on their behalf, obtain the signatures from your DAC, and submit the form to Graduate Academics through Workday.

#### **d. Dissertation**

The dissertation is the capstone of the doctoral program and should result in research that advances the state of the art in the chosen field. Dissertations may be written in a traditional format or composed of a portfolio where the main body of the dissertation integrates a set of refereed journal articles and peer-reviewed conference papers, which are included as appendices for the details. Regardless of the format, the results of the research must be deemed publishable in major scholarly journals.

The following are the guidelines for publication prior to dissertation defense, but should be considered the norm:

- one (1) accepted peer-reviewed journal article
- one (1) submitted peer-reviewed journal article
- two (2) presented refereed conference papers

The intent of this requirement is the belief that peer-reviewed research produces a superior dissertation, providing a broad review of quality and dissemination of the results to a wider community. See <https://www.stevens.edu/academics/library/submit-thesis-dissertation> for specific formatting and submission information.

All research that involves human subjects requires Institutional Review Board (IRB) approval. See [https://my.stevens.edu/osp/compliance/humansubject\\_irb/overview](https://my.stevens.edu/osp/compliance/humansubject_irb/overview) for more information on this matter.

### **e. Dissertation Defense**

The student, in conjunction with the dissertation advisor, is required to schedule the dissertation defense. The dissertation defense must take place at least three weeks prior to commencement.

The dissertation advisor must attend the dissertation defense. At most, one other member of the Dissertation Advisory Committee may be absent from the dissertation defense.

Once a student has worked with their dissertation advisor to schedule the dissertation defense, the student must submit the Dissertation Defense Announcement notice to Graduate Academics & Student Success at least 10 business days prior to the scheduled defense. Information on this process can be found on the [GA&SS website](#).

Students are required to submit a copy of their dissertation to the DAC four weeks before the date on which the student expects to defend the dissertation. It is strongly encouraged that all SSE research faculty members attend the public defense. To pass the final examination, a degree candidate must receive a favorable vote from a majority of the DAC, with at most a single negative vote.

If a student fails the public defense, there must be a lapse of one full semester (15 weeks) before rescheduling the defense. A student is allowed no more than two opportunities to successfully defend the dissertation. If a student fails, they must either disenroll from the program or exit the program with a master's degree.

Students should also notify Jessica Rosa in the SSE Center for Student Success ([jrosa@stevens.edu](mailto:jrosa@stevens.edu)) of their scheduled defense date. She will fill out the Defense Report form on your behalf, obtain the signatures from your DAC after the defense is complete, and submit the form to Graduate Academics through Workday.

### **f. Program Completion**

At the beginning of the semester in which the student expects to complete the dissertation defense (and all other requirements), the student needs to submit a [Program Completion Application](#) through Workday. The degree cannot be officially conferred unless this application is submitted and approved by the registrar.

## **4. Course Registration and Doctoral Activity Reports**

The [Workday Student Canvas page](#) contains user guides that show the steps for registration. In general, there are two ways to register:



- [Create and Register from a Schedule](#): Students can build a course schedule and register for all their classes at one time. Note that, depending on availability, certain classes or sections may close while students are building their schedule.
- [Register from a Course Section](#): Students can register for each class individually. This process allows them to prioritize individual classes when registering.

Students can access the full course schedule for any given semester by using the “[Find Course Sections](#)” feature in the Planning and Registration section of the Academics tab in Workday.

To register for research credits (SYS 960 or EM 960), students must find their advisor’s specific section of the course using the “[Find Course Sections](#)” feature and submit a [prerequisite override request](#) to obtain permission to enroll in that section. Students will receive a notification in their Workday inbox once the request is approved, and they will be able to complete the registration for that section at that point. If their advisor does not have such a section, students must let their advisor know that they need to request one.

If a student has completed all the course requirements, including research credits, they will need to register for DEAN 999 - Maintenance of Full-Time Status each semester until graduation. This registration category indicates that the student is still an active student, even if they are not taking classes. To register for DEAN 999, students need to submit a [prerequisite override request](#) to obtain permission to enroll in that section. Students will receive a notification in their Workday inbox once the request is approved, and they will then be able to complete the registration for that section.

Doctoral students who are enrolled in research credits (SYS960 or EM960) or DEAN 999 must submit a Doctoral Research Activity Report at the end of each semester through Workday. To submit a **Doctoral Research Activity Report**, students need to submit a request in Workday Student. Steps on how to create a request in Workday Student can be found [here](#). In Step 3, Doctoral Research Activity Report can be selected under Request Type.

## 5. Academic Standing Policies

Doctoral students with an Incomplete grade must complete the Incomplete by the end of the following semester. The student may file for an extension with the approval of their doctoral advisor, the chair of the SSE Ph.D. Program Committee, and the dean of Graduate Academics. Valid reasons for an extension include service in the armed forces or personal/family medical circumstances. Financial issues are not considered to be valid reasons for an extension. Inability to complete the Incomplete within the one-semester time period will result in an “F” for the course.

A student will be placed on probation under one or more of the following scenarios:

- Has received an F in a course that has not been improved by repeating the course.
- Has less than a B (3.0) average after earning 10 or more credits
- Has received three or more C’s

Once placed on probation, a student must meet with their advisor and complete a Remediation Action Plan (RAP). This plan must be submitted to the registrar before the student is allowed to take additional courses. The RAP form is available [here](#). Once the student is on probation, they have one semester to meet the requirements of the RAP to return to regular status. If they fail to meet the RAP terms, the student will be dismissed from the program.

## **6. Time Limit, Enrollment Continuity and Leave of Absence Policies**

A student who has earned a master's degree or its equivalent is allowed a maximum of six years to complete the requirements for the doctoral degree. Requests for an extension of this limit must be made in writing to the student's doctoral advisor who will then make their recommendation to the dean of Graduate Academics. The goal of SSE is that full-time students who enter with a master's degree shall be able to complete the program in approximately three to four years. The goal for part-time students is to complete the program in approximately five years.

All regular students are expected to maintain continuity of enrollment except for summer sessions. In other words, students must register every Fall and Spring semester until they graduate. If this cannot be done, the student must apply in writing for a leave of absence from their doctoral advisor, which is subject to the approval of the dean of Graduate Academics. A leave of absence is granted for a limited period only. The period may be extended at the discretion of the dean of Graduate Academics. Time spent in the Armed Forces of the United States while on leave of absence is not included in the six-year limitation noted above. Time spent on leave of absence for other reasons may or may not be included in the six-year limitation. Each case is decided based on individual circumstances by the dean of Graduate Academics.

Students can request a leave of absence through Workday [using these instructions](#).

A leave of absence does not waive a review of an action on a student's academic performance. Students who do not maintain continuity of enrollment and who do not obtain a leave of absence may be dropped from the program. Reenrollment requires permission of the dean of Graduate Academics and the SSE Ph.D. Program Committee.

The SSE Ph.D. Program Committee will meet annually at the end of the academic year to review the progress of all doctoral students. If a student does not make any significant progress during an academic year, the SSE Ph.D. Program Committee, in concert with the doctoral advisor, reserves the option to place the student on probation such that they will have to develop a remediation plan to accelerate progress. If the student is already on probation, the committee may transfer the student to a master's degree program or disenroll the student.