

# ECSE Graduate Program Handbook

# 2022

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The Graduate Program Handbook contains the rules, policies, and guidelines applicable to the graduate community within the Electrical, Computer, and Systems Engineering Department at Rensselaer Polytechnic Institute.

Department of  
Electrical,  
Computer, &  
Systems  
Engineering

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## 2 Introduction

### 2.1 Welcome from the Department Head

As Head of the Electrical, Computer, and Systems Engineering (ECSE), I would like to welcome you to the department to pursue your graduate education. This is an exciting time to be pursuing ECSE as a career – technology is advancing at breakneck pace, and you will be at the forefront of this tidal wave!

Ubiquitous sensors (e.g., from wearable devices) and autonomous devices (e.g., self-driving cars), all part of the Internet of Things (IoT), are producing data at an unprecedented and exponentially growing rate. New communication technology – think beyond 5G – and network architectures provide the infrastructure to move this massive amount of data efficiently and securely. Advanced algorithms interpret the data, make decisions, and choose actions based on data analytics, model prediction, and optimization, and drawing on artificial intelligence and machine learning (AI/ML). Combinations of new computer architectures, interconnect designs, and data processing are continuing the acceleration in computation, despite computer chips rapidly approaching the limit of Moore’s Law. You will be part of the ECSE family contributing to the exciting advances at these frontiers. ECSE faculty conduct a broad range of research including advanced computer architecture, photonics, Terahertz sensors, power electronics, IoT, cyberphysical systems, power systems, robotics, AI/ML, augmented reality/virtual reality, human-robot interaction, and others.

ECSE faculty participate in a number of large research centers that support cross-disciplinary research, such as the NSF Engineering Research Center in Lighting Enabled Systems and Applications (LESA), the NSF/DoE Engineering Research Center for Ultra-Wide-Area Resilient Electrical Energy Transmission Networks (CURENT), the Center on Future Energy Systems (CFES), and the Center for Automated Technologies and Systems (CATS). These centers offer resources such as engineering staff and research equipment to help your research.

ECSE offers more than just technical studies – I would encourage you to use your graduate school experience to make life-long friends, learn about other fields, and engage the broader ECSE community through the ECSE Graduate Student Council.

Graduate study at a top engineering department may include moments of frustration, stagnation, or even confusion. ECSE faculty and staff are here to help, and Rensselaer offers many other resources. Don’t hesitate to explore these avenues of support.

ECSE was founded over a century ago, and RPI is the oldest technical university in the United States. We have had numerous illustrious alumni, including inventors of the digital camera and microprocessors, National Freedom Medal winners, successful entrepreneurs, and university presidents. You will be part of this tradition!

I wish you the best with your graduate studies in ECSE -- and have fun in the process!

John T. Wen  
Department Head  
[wenj@rpi.edu](mailto:wenj@rpi.edu)

## 2.2 Handbook Introduction by the GPD

Welcome to graduate study within the Electrical, Computer, and Systems Engineering (ECSE) Department at Rensselaer Polytechnic Institute! We are delighted that you have chosen to pursue graduate studies within our department.

The ECSE Department is part of Rensselaer's School of Engineering (SoE). ECSE offers a Master of Engineering (MEng), Master of Science (MS), and a Doctor of Philosophy (PhD) in Electrical Engineering (ELEC) and in Computer and Systems Engineering (CSYS). There is no difference in the requirements between the ELEC and CSYS majors. Students should simply choose the major that best matches their area of interest.

The purpose of this handbook is to acquaint new and continuing ECSE graduate students with Departmental expectations and the requirements that a student must satisfy in order to complete a graduate degree. This manual contains specific Departmental requirements in addition to pertinent Institute rules and regulations. Additional information can be found on our website at <http://ecse.rpi.edu/> and the [RPI Catalog](#). The information in this handbook are also summarized as presentation slides presented regularly at departmental orientation events, and available on the ECSE Graduate Programs tab on the ECSE website.

The new handbook has undergone significant revisions. Most notably, the handbook includes revised description for 10 graduate area concentrations in the department. The area concentrations include updated listings of various key graduate level courses. These are used for PhD students to specify new requirements for Major/Minor concentrations that will apply to students who will start their PhD programs in Fall 2020. For MS students, the policies have not changed significantly, and the revised area concentrations are to be considered an optional guide for MS students to select courses for their MS studies. For PhD students, there is a new format for the DQE, called the post-2020 DQE. The new format must be followed for students who start their PhD program on or after Fall 2020. Ongoing PhD students have the option to choose between the post-2020 DQE or the existing pre-2020 DQE.

For additional information or explanation of any of the requirements, please contact the ECSE Graduate Student Services Office by calling (518) 276-2554 or emailing [gpd@ecse.rpi.edu](mailto:gpd@ecse.rpi.edu).

Enjoy your studies in ECSE!

Professor Alhussein Abouzeid,  
ECSE Graduate Program Director

## 2.3 Graduate Services Department Contact List

- Professor Richard Radke, Graduate Program Director – 518-276-6483; [rjradke@ecse.rpi.edu](mailto:rjradke@ecse.rpi.edu)
- Ms. Kelley Kritzk, Graduate Program Administrator – 518-276-2554, [kritzk@rpi.edu](mailto:kritzk@rpi.edu)

## 2.4 Important Dates FY 2020-2021

The important dates are listed on the RPI [Calendar](#). Please note that there may be calendar changes due to Covid19 or other reasons, so please always follow announcements sent to the graduate students list, as well as other institute announcement. These dates include add/drop courses,

nomination of Master's Committee, dissertations submission, doctoral defense, and other important deadlines.

### 3 The Doctoral of Philosophy (PhD) Degrees

The Doctor of Philosophy degree is awarded in Electrical Engineering or Computer and Systems Engineering. There is no difference in the requirements between these two. Students should choose the major that best matches their area of research. The most important distinction of a PhD degree is that it requires a substantial and original contribution to knowledge in some area of ECSE.

Advanced study and research for a Ph.D. degree is conducted under the guidance of a thesis adviser representing the department. The student formulates an individual Plan of Study in consultation with the adviser. Major milestones for the Ph.D. program in ECSE include passing a doctoral qualifying exam (DQE), a doctoral candidacy exam (DCE), and successfully defending the dissertation in an open presentation to his or her committee. The oral portion of the DQE should be taken during the first year of the doctoral program. The course minor/major portion of the DQE must be taken before the DCE. The doctoral degree requirements include 72 credits for students entering the graduate program with a bachelor's degree or 48 credits for students entering with a master's degree. The Ph.D. dissertation must be scholarly, creative, and original. The department expects the Institute requirements for candidacy and residency to be satisfied.

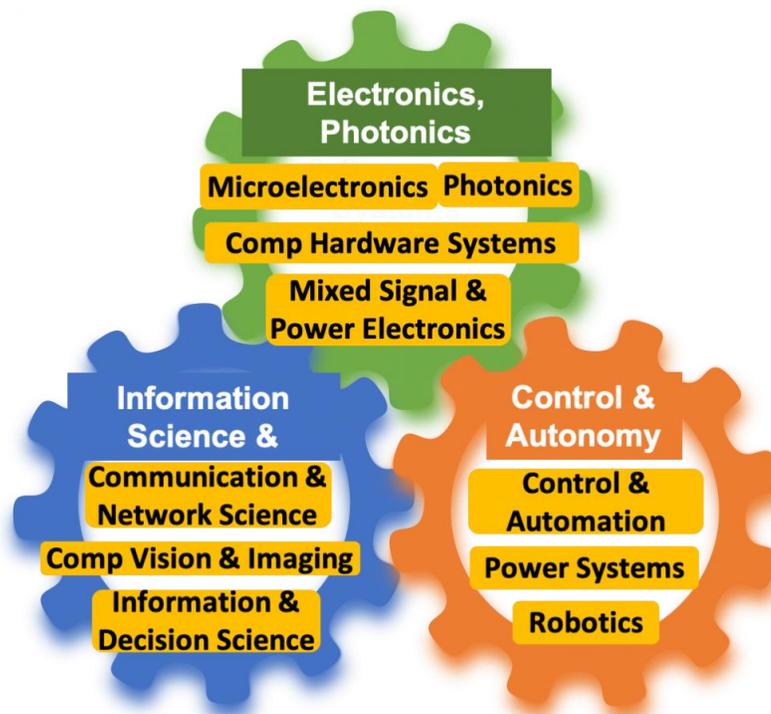


Figure 1: Graduate Program Areas and Concentrations

#### 3.1 The PhD Program Requirements:

Students entering the program should hold an accredited bachelor's degree in an appropriate branch of engineering. Prospective students interested in earning both the MS and PhD should apply directly to the PhD program, as they will have the opportunity to add the Master's degree once enrolled in the program. The doctoral degree requires a total of seventy-two (72) credits beyond a Bachelor's degree or forty-eight (48) credits beyond a Master's degree.

In addition to the institute requirements and those listed above, students pursuing a Ph.D. degree thesis in Electrical Engineering (ELEC) or Computer and Systems Engineering (CSYS) must complete the following requirements:

- 72 credit hours beyond the Bachelor’s degree; 48 credits beyond the Master’s
- A minimum of 12 and a maximum of 36 dissertation credits
  - This means that there should be a minimum of 36 non-dissertation credits (courses) for the 72 credit plan and a minimum of 12 non-dissertation credits (courses) for the 48 credits beyond Master’s plan
- Two thirds of total credit hours (excluding thesis credits) at the 6000-level
- No more than fifteen 4000-level credits
- At least one Math elective (3-4 credits) with MATH or MATP prefix
- No more than 3 credits of Independent Study
- No more than 24 transfer credits (for students joining without an M.S. degree)
- The ratio of 6000-level (excluding thesis) to 4000-level credits on 72-credit Plan of Study must be 2 or greater with maximum of 15 credits at 4000-level.
- No 1000- or 2000-level courses may be applied towards the degree.

For students entering with a Master’s degree, the Master’s would be reflected in the 72-credit doctoral plan of study as a 24-credit block. This satisfies the residency requirement that 48 credits be completed at Rensselaer.

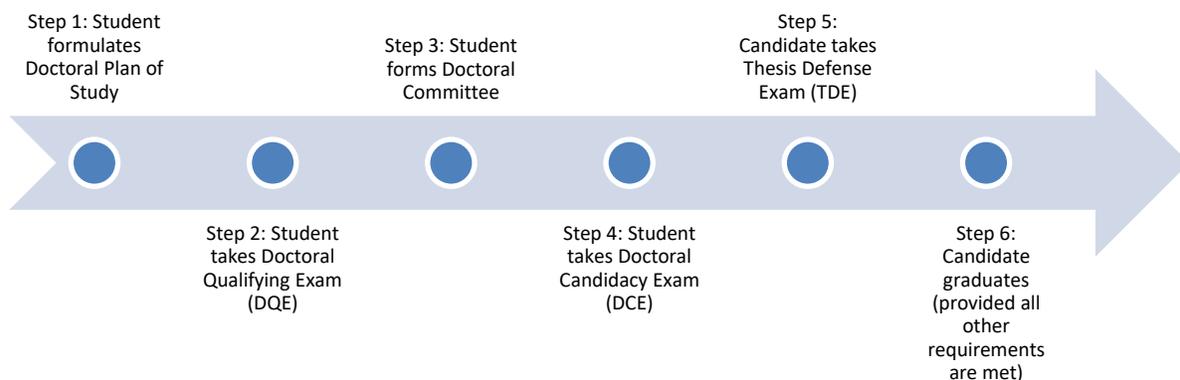


Figure 2. Steps in ECSE Doctoral program

The major milestones of the PhD program are indicated in Figure 2; The Doctoral Qualifying Examination (DQE), The Doctoral Candidacy Examination (DCE), and the Thesis Defense Examination (TDE).

### 3.2 The Doctoral Qualifying Examination

The purpose of the DQE is to determine the potential or likelihood that the student will be able to satisfactorily complete the doctoral requirements, including the ability to produce high-quality independent research. The exam evaluates not only the student’s knowledge, but also their ability to apply that knowledge to analyze and synthesize ideas at an advanced level in the areas being examined.

Students who join the PhD program on or after the Fall 2020 semester must follow the **Post-2020 DQE** format, detailed in Section 3.2.1. Independent input by the PhD advisor is also taken into account, in addition to the examiners input and course performance.

### 3.2.1 The Post-2020 Doctoral Qualifying Examination

The term “DQE” in this section refers to the post-2020 DQE. The purpose of the DQE is to make an early determination of the potential or likelihood that the student will be able to satisfactorily complete the doctoral requirements, including the ability to produce high-quality independent research. The DQE also establishes requirements for doctoral students to satisfy breadth and depth of knowledge in certain concentration areas of ECSE. All the DQE requirements need to be satisfied before scheduling of the Doctoral Candidacy Exam (DCE).

The Post-2020 DQE consists of two parts:

- The Research Qualifying Exam (RQE): The RQE is described below.
- The Course Concentration Requirements: The Major/Minor course concentration requirements are described below.

#### 3.2.1.1 The Research Qualifying Exam (RQE)

**Objective:** The RQE evaluates not only the student’s knowledge, but also their ability to apply that knowledge to analyze and synthesize ideas at an advanced level in the area being examined. All students have two opportunities to pass the RQE. The RQE is given once in the Fall and once in the Spring.



A student can consult with their PhD advisor only for the purpose of completing the RQE Application Form. However, once the RQE assignment is made, the student cannot consult with the advisor or anyone else for preparing the oral or written portions of the RQE.

**How to apply:** Students planning to take the RQE, must complete the "**Application for Research Qualifying Examination**" form (available in JEC 6003, and also in the Appendix) and submit it to the Doctoral Program Administrator at the beginning of the exam semester. In preparing this form, the student must consult with their research advisor to list 3 research papers that are **representative** of the student’s intended research area. The student will also designate one of the ten Concentration Areas as their major research area. *Notice that the inclusion of the 3 research papers is only meant to indicate the area of research of the student, and that the committee is not limited to, and in most cases will not, make the RQE Assignment from this list.*

**RQE Committee:** The RQE is composed of **i)** a written report by the student delivered to the RQE Committee chair one week before the oral examination period, and **ii)** an oral exam conducted by the RQE Committee. The oral RQE exam is conducted over 1-hour by an *RQE Committee* assigned to each student by the GPD at the beginning of the exam semester. The RQE Committee is composed of two *examining faculty* and one *observing faculty*, who also chairs the RQE Committee. The student’s PhD advisor cannot be a member of the RQE Committee.

**RQE Assignment:** At the beginning of the exam semester, the student will receive a letter titled “**RQE Assignment to Doctoral Student**” listing **i)** the written RQE report assignment, including assigned papers – 2 papers chosen by the committee, typically **not** from the list provided by the student, but are from the **general area** related to those papers, **ii)** the RQE Committee members, **iii)** the date the written RQE report is due to the RQE Committee Chair, **iv)** the exact timeframe of a two week examination period during which they have to schedule a 1-hour RQE exam with the committee, **v)** the date of the ECSE faculty RQE meeting where the decisions to pass will be made. It is each student’s responsibility to coordinate the specific oral exam date and time with the RQE Committee. If a student

applies to take the RQE and fails to follow-through, the examination is counted as having been taken and the student has failed the exam.

**The decision process for passing the RQE:** The decision as to whether or not a student passes the RQE is made by the entire ECSE faculty after reviewing: **1)** the “**RQE Student Evaluation by RQE Committee**” form which summarizes the evaluation of the student’s performance in the RQE oral exam and RQE written report, **2)** the student's academic record, particularly courses taken at RPI after being enrolled as a PhD student, and **3)** the “**RQE Student Evaluation by PhD Advisor**” form which contains the recommendation of the student's research/project adviser(s) concerning the student's ability to conduct independent research of high quality. Since research is an important aspect of the doctoral program, the student is strongly encouraged to engage in research activities with a faculty advisor, either at the master’s or doctoral level, before taking the RQE.



The decision as to whether or not a student passes the RQE is made by the entire ECSE faculty after reviewing 1) the RQE Committee evaluation of the student’s performance in the RQE oral exam and RQE written report, 2) the student's academic record, and 3) the recommendation of the student's research or project adviser(s) concerning the student's ability to conduct independent research of high quality.

**Timing of the RQE:** The RQE is given twice each academic year, once in the Fall and once in the Spring. Full-time students admitted without a master’s degree are expected to take the RQE in their third semester after entering the ECSE graduate program. Students who enter with a master’s degree are expected to take the RQE in their second semester in the PhD program. In the awarding of financial aid (including research and teaching assistantships), preference is given to students who have passed the RQE. However, this should not encourage students to take the RQE before their designated semester unless they are ready. It is also important to make progress on research with the PhD adviser before taking the RQE. Questions about how the RQE affects graduate financial aid should be directed to the Graduate Program Director, at [gpd@ecse.rpi.edu](mailto:gpd@ecse.rpi.edu). **A student may take the RQE no more than twice.**



The RQE examiners may ask questions about basic knowledge/principles related to the area of the paper(s) assigned to you. They will assess your depth of understanding of basic principles, creativity, critical thinking, and oral/written communication skills. They will not specifically limit questions to any particular courses.

**Preparing for the exam:** Three important points should be noted regarding the RQE. First, students should select an exam area that they are familiar with. The area typically will align with the student’s research interests. Second, the oral examiner's primary objective is not to determine just how much material a student knows in a given area, but how well the student is able to use and apply that knowledge. The students are encouraged to take a look at the RQE Committee Evaluation Form to understand the criteria for evaluation, which include knowledge of fundamental principles related to the assigned area/paper(s), ability to apply basic principles to solve research problems, creativity, critical thinking, oral communication skills, and written communication skills. Third, the RQE is an

individual exam, students are not allowed to seek help from the advisor, other graduate students, or anyone else, to prepare for the exam once it has been assigned.

**During the exam:** During the 1-hour exam period, the student must:

- Submit a five-page written report synthesizing the assigned paper and outlining possible open research direction(s).
- Give a 20 minute oral presentation of their report.
- Respond to questions from committee members about the report and associated foundational concepts.

**Assessment:** In assessing the student, the RQE Committee looks for the following:

- Understanding of relevant fundamentals.
- Understanding of related literature.
- Clarity and completeness of written document.
- Quality of oral presentation.
- Ability to field questions.

Note: The assignment in the 2nd RQE exam for a student who is re-taking it shall not include papers assigned in the student's 1st failed RQE exam.

### *3.2.1.2 Course Concentrations: Major/Minor Requirements*

The second component of the DQE is to satisfy the Major/Minor requirements. Each PhD student has to complete the "**Doctoral Student Major/Minor Concentrations.**" The student will indicate one Major area and one Minor area from with the 10 ECSE Concentration Areas listed below. To satisfy the major requirement, the student needs to take three of the courses listed in their chosen Major. To satisfy the minor requirement, the student needs to take two of the courses listed in their chosen Minor.

Students joining the PhD program after already obtaining an MS degree may apply to the GPD to request that up to a total of 2 of the 5 Major/Minor course restrictions be waived. This can be indicated on the same ECSE Concentration Form. In that case, the student needs to indicate the equivalent course already taken, and this must be first approved by the advisor. Notice that this does not change any of the total credit requirements or guidelines for the program, rather, this is used to satisfy some of the course concentration aspect.

In order for a course to be used towards the Major/Minor requirement, the student must pass the course with a grade of B or above. Notice also that, in case a course is cross-listed in multiple areas, the course can be used towards satisfying only one Major/Minor. The student can waive a maximum of 2 out of the 5 required courses, the rest need to be taken at RPI following the Major/Minor guidelines.

**Unless stated otherwise in the areas you select, choose any 2 for minor and any 3 for major in each area.**

#### **1. Control and Automation**

Students take: ECSE 6400 Systems Analysis Techniques, and one (if Minor) or two (if Major) of:  
ECSE 6420 Nonlinear Control Systems  
ECSE 6440 Optimal Control Theory  
ECSE 6460 Multivariable Control Systems  
ECSE 6480 Adaptive Systems

ECSE 6500 Distributed Systems and Sensor Networks (or its equivalence)  
ECSE 6170 Modeling and Simulation for CPS  
ECSE 6660 Internetworking of Things

## **2. Robotics**

Students take ECSE 6470 Robotics I, and one (if Minor) or two (if Major) of:

ECSE 6490 Robotics II  
ECSE 6400 Systems Analysis Techniques  
ECSE 6420 Nonlinear Control Systems  
ECSE 6170 Modeling and Simulation for CPS  
ECSE 6650 Computer Vision  
ECSE 6850 Introduction to Deep Learning

## **3. Information and Decision Sciences**

ECSE 6510 Introduction to Stochastic Signals and Systems  
ECSE 6520 Detection and Estimation Theory  
ECSE 6530 Information Theory and Coding  
ECSE 6965 Introduction to Deep Learning

## **4. Computer Vision and Imaging**

ECSE 6510 Introduction to Stochastic Signals and Systems  
ECSE 6610 Pattern Recognition  
ECSE 6650 Computer Vision  
ECSE 6965 Introduction to Deep Learning

## **5. Communication and Network Science**

Students must take ECSE 6510 Introduction to Stochastic Signals and Systems. In addition, for Major, students need to take one course in each of the two topics (Communications and Networks), as listed below; for Minor, students need to take one course in either of these topics.

Communications:

ECSE 6520 Detection and Estimation Theory  
ECSE 6530 Information Theory and Coding  
ECSE 6560 Digital Communications

Networks:

ECSE 6660 Internetworking of Things

## **6. Power Systems**

ECSE 6050 Advanced Power Electronics  
ECSE 6110 Power Engineering Analysis  
ECSE 6120 Power Quality  
ECSE 6180 Advanced Power System Modeling and Control  
ECSE 6140 Power Generation Operation and Control  
ECSE 6170 Modeling and Simulation of Cyber-Physical Systems  
ECSE 6260 Semiconductor Power Devices  
ECSE 6995 Renewable Energy

## **7. Computer System Design**

ECSE 6050 Advanced Electronic Circuit

ECSE 6680 Advanced VLSI Design  
ECSE 6960 Advanced Computer Systems

## 8. Microelectronics

All students must take ECSE 6230 - Semiconductor Devices and Models I.  
In addition, majors must take a laboratory based class (ECSE 6300 - IC Fabrication Laboratory or ECSE 6200 Semiconductor Device Characterization).  
ECSE 6210 Advanced Device Concepts  
ECSE 6220 Physical Found. of Solid-State Devices  
ECSE 6310 Fund. of RF/Microwave Engineering  
ECSE 6290 Semiconductor Devices and Models II  
ECSE 6300 IC Fabrication Laboratory or ECSE 6200 - Semiconductor Device Characterization  
ECSE 6050 Advanced Electronic Circuit  
ECSE 6270 Optoelectronics  
ECSE 6280 Light Emitting Diodes

## 9. Photonics

ECSE 6220 Physical Foundations of Solid-State Devices  
ECSE 6270 Optoelectronics  
ECSE 6280 Light Emitting Diodes  
ECSE 6210 Advanced Device Concepts

## 10. Power Electronics

ECSE 6230 Semiconductor Devices and Models I  
ECSE 6260 Semiconductor Power Devices  
ECSE 6200 Semiconductor Device Characterization  
ECSE-6090 Advanced Power Electronics

## 3.3 Forming a Doctoral Committee

As soon as the student has chosen a research area, they should arrange to conduct thesis research with a thesis adviser. If the thesis adviser is not a full-time tenure-track ECSE faculty member, then there must be a separate academic co-advisor who meets those criteria. If the student's thesis advisor is not a full-time Rensselaer faculty member, then a full-time ECSE faculty member must be Co-chair of the doctoral committee.

The student and the thesis adviser choose an appropriate doctoral committee. The student then completes a "[Nomination of Doctoral Committee](#)" form and submits it to the Doctoral Program Administrator at least one month prior to taking the DCE. The form can be accessed from the Graduate School's website at <https://info.rpi.edu/graduate-academics/submit-your-thesis-dissertation/#Forms> under the "Submit Your Thesis/Dissertation" tab, and a hardcopy can be found in JEC 6003. This form must be complete and contain the signatures of the Committee members. After departmental approval, it is forwarded to the Graduate School, which then officially appoints the student's doctoral committee.

The committee should include at least four (4) members and represent the principal areas included in the student's Plan of Study. Three members must have an appointment within the ECSE Department (with the rank of assistant professor or higher) and one member must be from outside the ECSE Department. If a committee member is from outside Rensselaer, a curriculum vitae for this person must accompany the Nomination of Doctoral Committee form. In addition, the student's advisor

(typically designated the committee chair) should provide a letter of support that specifies how the outside member will contribute to the student's research. The committee will conduct the student's Doctoral Candidacy Exam (DCE) and the student's final Thesis Defense Examination. If any members of the doctoral committee change, the student will need to submit a new Nomination of Doctoral Committee form and a strong justification will be required.

### 3.4 Doctoral Candidacy Examination (DCE)

A student may apply for the candidacy examination when their course work nears completion and they have the approval of the doctoral committee. The request should be coordinated with the student's thesis adviser.

The DCE is an oral examination, conducted by the student's appointed doctoral committee, following submission of a written thesis proposal. The exact content and nature of the DCE is determined by the student's doctoral committee. Typically, it is a concise presentation of the work so far and the work proposed, followed by questions from the committee. The purpose of the DCE is to determine whether the student has made satisfactory progress in their doctoral program, including progress in the chosen doctoral dissertation area, and whether they demonstrate the ability and have a viable plan to complete the doctoral dissertation with distinction.

After the student's thesis proposal has been approved by the thesis adviser, copies of the proposal should be given to the doctoral committee, at least one (1) week prior to the scheduled DCE. The thesis proposal should include i) a concise discussion of the proposed thesis effort; ii) an in-depth review of the pertinent literature (together with how the proposed effort would build on and extend existing knowledge, either theoretically and/or practically); and iii) a concise presentation of some preliminary results which would suggest that the effort can be successfully undertaken. However, the scope of the DCE is not limited to the thesis proposal.

#### 3.4.1 Record of Candidacy Examination

This form must be completed and brought to the DCE for the committee members' signatures and recommendations (pass or fail). The form can be found on the Graduate School's website at [under the "Submit Your Thesis/Dissertation"](#) tab and in JEC 6003.

Once the record of candidacy form is complete and has the original signatures of all committee members, it should be submitted to the Graduate Program Administrator for processing. It should be noted that, after passing the DCE, the student is formally identified as a doctoral candidate.

#### 3.4.2 Responsible Conduct of Research (RCR) training

The Graduate School requires the completion of [Responsible Conduct of Research \(RCR\) training through CITI](#) as well. A copy of the CITI Program completion report (certificate) must accompany the Record of Candidacy Examination form that is submitted to the Graduate School. Instructions for CITI registration and training can be found on the second page of the Record of Candidacy Examination Form.

### 3.5 Thesis Defense Examination (TDE)

The thesis defense is one of the final steps in the doctoral program. **The TDE cannot be scheduled in the semester immediately following the DCE, there has to be at least one semester in between. This is an institute policy, and its rationale is that the DCE needs to be taken early in order to involve the dissertation committee in the research earlier in the process.** The purpose of the TDE is for the student to present and defend the doctoral thesis. The defense is conducted by the student's doctoral committee and is required to be open to the public. The ensuing committee deliberation is not open to the public, but there is a period where the candidate will field questions from the audience.

The TDE is given whenever i) the candidate has registered for all the credits shown on the Plan of Study, and ii) the candidate's doctoral committee approves the student's request for a TDE. The request should be coordinated with the student's thesis adviser. The TDE should be held by the date listed in the academic calendar for the semester of graduation. Furthermore, the completed thesis must be presented to the candidate's thesis adviser at least one month before the TDE. Each member of the doctoral committee must be given an unbound copy of the thesis at least two weeks before the scheduled TDE. An announcement – **including an abstract and location** – of the TDE must be prominently posted and an electronic copy sent to the Graduate Program Administrator at least one week prior to the TDE. It will then be distributed to all ECSE faculty members and current graduate students. If possible, a copy of your thesis should also be posted on your website with a link indicated on the announcement. (Students are encouraged to create a website of their own.)

	An announcement of your defense (including an abstract) should be distributed to all ECSE Faculty and prominently posted, and an electronic copy must be forwarded to the Graduate Program Administrator.
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After passing the TDE, the student will need to submit a completed [Record of Dissertation Exam](#) form to the Graduate Program Administrator. This form must be complete and contain the original signatures of the Committee members. The dissertation must be approved by a minimum of three members of a faculty committee of four members. By signing this form, your Committee members are indicating that both your defense and dissertation have met their approval.

	OGE requires a complete, signed Record of Dissertation Exam Form and supporting documents by the published dissertation submission deadline that can be found in the Academic Calendar. For a list of the forms that need to be submitted to OGE after the TDE, please refer to <a href="#">the Doctoral dissertation checklist</a> .
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### 3.6 Thesis/Dissertation Submission

All doctoral candidates must submit a doctoral dissertation to the Office of Graduate Education (OGE) for final approval after passing the thesis defense. OGE has stringent formatting specifications and requirements for all submissions. It is, therefore, imperative that you review the [Thesis Writing Manual](#) before submitting your document. We highly encourage you to make an appointment for a preliminary review of your dissertation with OGE at [graduate@rpi.edu](mailto:graduate@rpi.edu) before your formal submission. The manual can be accessed directly from OGE's website.

Please refer to the Institute's [Submit Your Thesis/Dissertation](#) page to access the Dissertation Checklist,

Submission Tips and Techniques, and the Submission site to upload one's dissertation, etc.

Please note that your thesis will be subject to an academic integrity review. All figures and text that have been previously published must be referenced. This includes your own work previously published elsewhere! Please refer to the [thesis manual](#) for an example of how to cite previously published work.

### 3.7 Fast-Track Bs-PhD

The ECSE department offers a B.S.-Ph.D. program for ECSE undergraduate students with a passion for research. In this unique program, students are able to conduct research during their undergraduate studies, and begin their Ph.D. immediately after receiving their B.S. degree. As admitted B.S.-Ph.D. students transition to graduate status, they will participate in graduate program seminars and activities.

Current students pursuing a B.S. degree at RPI and interested in this fast-track program can apply by completing the ECSE BS-PhD application package which is available online or can be obtained from the ECSE graduate services office. The application includes an application form (Appendix 6.7), resume, a statement of objectives, a recommendation letter from a prospective BS/PhD advisor, two faculty recommendation letters, a BS-PhD plan of study, and a copy of the student's academic transcript. Students interested in this program are encouraged to first meet with the ECSE Graduate Program Administrator or the Graduate Program Director to confirm the suitability of this program and to discuss their plans, and meeting with the designated ECSE advisor to develop the undergraduate plan of study.

The admission to the BS-PhD program does not change the requirements of either the BS degree or the PhD degrees. Rather, it enables the student to formally engage in graduate research activities earlier. When a student is admitted to the BS-PhD, the admission to the PhD is conditioned on maintaining a minimum of 3.5 cumulative GPA, maintaining satisfactory progress in their undergraduate degree, completion of their BS degree, and maintaining satisfactory progress in their research. During their undergraduate years, students will continue to be advised by their BS advisor for degree clearance purposes, but must also meet with PhD advisor, for advising, to ensure they're registering for the correct PhD courses, meeting their research requirements, and participating in programming. When students graduate with their BS, Registrar will automatically update the record to show the student as a graduate student pursuing a PhD degree. Until they graduate with the BS, students are considered undergraduates. Once students graduate with the BS they are advised fully by their PhD advisor.

An outline of an example curriculum and plan of study template is included in Appendix 6.8. The application deadline each year is updated and posted on the ECSE Website. Students are encouraged to apply by the beginning of their junior year.

## 4 The Master's Degrees

The ECSE department awards the Master of Science (MS) degree in Electrical Engineering or Computer and Systems Engineering. The Master of Science can be completed with or without thesis. The without thesis option involves additional courses and/or project. The descriptions and program requirements are detailed in the next sections. This chapter also includes a Program Planner template for each Master program to assist with the development of a valid Plan of Study.

### 4.1 The Master of Science (MS) with Thesis Degree

The M.S. program with thesis is designed to prepare students for a professional career and/or eventual pursuit of a doctoral degree. Students entering the program typically hold an accredited bachelor's degree in an appropriate branch of engineering. Students completing the M.S. degree will write a thesis based on a research topic chosen by the student and a professor who serves as the academic adviser. The corresponding thesis, independently written by the student as a single author, must be approved by the adviser as well as two additional committee members from the department's faculty (Master's Committee). A thesis defense will be presented to this committee.

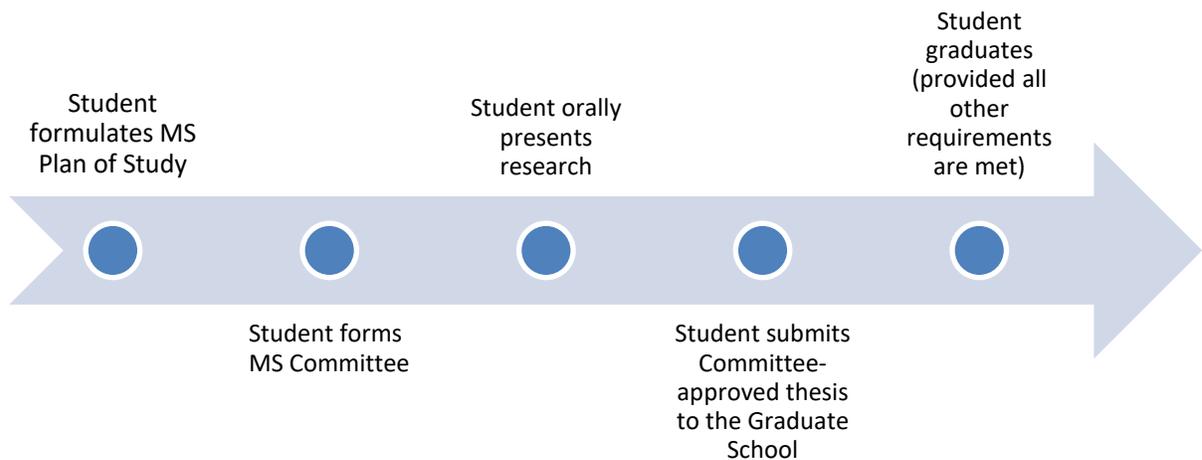


Figure 3. Steps in MS with Thesis ECSE program

#### 4.1.1 MS with Thesis Program Requirements

In addition to the Institute requirements and those listed above, students pursuing the M.S. with thesis in Electrical Engineering (ELEC) or Computer and Systems Engineering (CSYS) must complete the following requirements:

- 30 total credits (including the M.S. thesis credits as noted below)
- At least 15 non-thesis credits taken at the 6000 level
- At least 12 credits taken within the ECSE Department\*
- At least one Math elective (3-4 credits) with MATH or MATP prefix
- No more than 6 transfer credits
- No more than 3 credits of Individual Project (e.g. ECSE-6980) or Independent Study (e.g. ECSE-6940)
- Six (6) OR nine (9) M.S. thesis credits. Six is typical. Nine is for cases requiring an exceptional amount of work and must be justified by the student's research advisor.
- No 1000- or 2000-level courses may be applied towards the degree.

Students who do not have adequate preparation for their chosen area of specialization may need to take background courses in addition to the 30-credit-hour requirement. \*Any exceptions will require prior written approval from the Graduate Program Director

Refer to the Master of Science with Thesis Program Planner form at the end of this section.

#### 4.1.2 Forming an MS Thesis Committee

MS (thesis) students are expected to formulate a thesis problem in consultation with their research advisor. The supervision of the research for the thesis is entrusted to a committee, whose members are selected by the student and advisor and must then be approved by the Graduate Program Director (GPD) and the Office of Graduate Education (OGE). The committee consists of three members, with the advisor serving as chair. Typically, the committee includes three ECSE tenure-track faculty, but exceptions can be made when appropriate. If a student wishes to nominate someone from outside the department to serve on the committee, the advisor will need to submit a brief justification to the GPD, detailing how this external member is particularly knowledgeable in the student's research area.

Once the committee is determined, the student is expected to file a [Nomination of Master's Thesis Committee](#) form with the Graduate Program Administrator, who will forward the original document to the Graduate School for final approval. This document is due to the Graduate School at the beginning of the semester the student intends to graduate. Please refer to the [Academic Calendar](#) for the exact deadline that applies to your graduation semester.

#### 4.1.3 MS Thesis & Oral Presentation

All MS with thesis students are expected to present their research orally. This is typically done during the semester in which the student intends to graduate. The required oral presentation, which must be approved by the thesis advisor, can be one of the following:

1. Program or Institute Seminar

NOTE: A presentation announcement must be posted publically within the department (electronic or paper copy) at least two weeks before the date of the presentation. Faculty representation is required. Contact the Graduate Program Administrator for electronic posting.

2. Presentation at a conference or symposium.

3. Traditional thesis defense.

[The Record of Master's Thesis & Oral Presentation](#) is completed and signed by the student's committee once the student has met the requirement for the oral presentation and the thesis meets the approval of the committee.

#### 4.1.4 MS Thesis Submission

After meeting the oral presentation requirement, all MS candidates must submit the thesis to the Office of Graduate Education (OGE) for final approval. OGE has stringent formatting specifications and requirements for all submissions. It is imperative that you review the Thesis Writing Manual prior to the submission of your document. We highly encourage you to make an appointment with the Graduate School for a preliminary review of your thesis at [graduate@rpi.edu](mailto:graduate@rpi.edu) before your formal submission. The manual can be accessed directly from the Graduate School's website.

Please refer to the Institute's [Submit Your Thesis/Dissertation](#) page to access the [Master's Thesis Checklist](#), the [Submission Tips and Techniques](#) online workshop, and the [Submission site](#). Please note that your thesis will be subject to an academic integrity review. All figures and text that have been

previously published must be referenced. This includes your own work previously published elsewhere! Please refer to the thesis manual for an example of how to cite previously published work.

### 4.1.5 MS with Thesis Program Planner

Name \_\_\_\_\_

Entry Term \_\_\_\_\_

**Graduation Requirements:** 30 credits

- At least 15 (non-thesis) credits taken at the 6000 level.
- At least 12 credits taken within the ECSE Department (ECSE XXXX).
- Six (6) OR Nine (9) MS thesis credits
- At least one Math course (3-4 credits)
- No more than 6 transfer credits
- No more than 3 credits of Independent Study (e.g. ECSE-6940)

Course #	Course Title	Credits	Term/Year
I. Required – ECSE Coursework (12 credits)			
ECSE - _____	_____	_____	_____/____
ECSE - _____	_____	_____	_____/____
ECSE - _____	_____	_____	_____/____
ECSE - _____	_____	_____	_____/____
II. Math Course (3-4 credits)			
MATH- _____	_____	_____	_____/____
III. Master’s Thesis (6 <u>OR</u> 9 cr.)			
ECSE-6990	_____	_____	_____/____
ECSE-6990	_____	_____	_____/____
ECSE-6990	_____	_____	_____/____
IV. Free Electives (5-9 credits)			
ECSE - _____	_____	_____	_____/____
_____ - _____	_____	_____	_____/____
_____ - _____	_____	_____	_____/____
Total Credits	_____	_____	

### 4.2 The Master of Science (MS) without Thesis Degree

The M.S. without thesis is intended to be a degree for those who wish to enter professional practice upon completion. Students entering the program typically hold an accredited bachelor’s degree in an

appropriate branch of engineering. A 6-credit master's project (ECSE-6980), with faculty supervision and evaluation, is an option.

#### 4.2.1 MS without Thesis Program Requirements

In addition to the Institute requirements and those listed above, students pursuing the M.S. without thesis in Electrical Engineering (ELEC) or Computer and Systems Engineering (CSYS) must complete the following requirements:

- 30 credits
- At least 18 credits taken at the 6000 level
- At least 18 credits taken within the ECSE Department\*
- At least one Math elective (3-4 credits) with MATH or MATP prefix
- No more than 6 transfer credits
- No more than 6 credits of Master's Project (ECSE-6980)
- No more than 3 credits of Independent Study (ECSE-6940)
- No 1000- or 2000-level courses may be applied towards the degree.

Students who do not have adequate preparation for their chosen area of specialization may need to take background courses in addition to the 30-credit-hour requirement.

\*Any exceptions will require prior written approval from the Graduate Program Director.

Refer to the Master of Science without Thesis Program Planner form on the next page.

## 4.2.2 MS without Thesis Program Planner

Name \_\_\_\_\_

Entry Term \_\_\_\_\_

### Graduation Requirements: 30 credits

- At least 18 credits must be taken at the 6000 level.
- At least 18 credits must be taken within the ECSE Department (ECSE XXXX).
- At least one Math elective (3-4 credits)
- No more than 6 transfer credits
- No more than 3 credits can be taken as an Independent Study (e.g. ECSE-6940)

Course #	Course Title	Credits	Term/Year
I. Required – ECSE Coursework (18 credits)			
ECSE - _____	_____	_____	_____/____
ECSE - _____	_____	_____	_____/____
ECSE - _____	_____	_____	_____/____
ECSE - _____	_____	_____	_____/____
ECSE - _____	_____	_____	_____/____
ECSE - _____	_____	_____	_____/____
II. Math Elective (3-4 credits)			
MATH- _____	_____	_____	_____/____
III. Free Electives (9 credits)			
_____ - _____	_____	_____	_____/____
_____ - _____	_____	_____	_____/____
_____ - _____	_____	_____	_____/____
Total Credits		_____	

## 4.3 Co-Terminal Masters Degrees (BS/MS Degree)

ECSE's Co-Terminal program is open to current ECSE undergraduates. The purpose is to provide top undergraduates an opportunity to pursue a Master's degree while maintaining their undergraduate Rensselaer funding. Co-Terminal students are required to graduate with their bachelor's degree in up to eight semesters, with a minimum GPA of 3.0. After graduating with a BS degree, they have up to two semesters to complete a master's degree. The GRE exam is not required. RPI students with a BS degree in a closely related field are encouraged to consult with the ECSE graduate services office or the GPD before applying. Most forms listed in the Application Requirements below can be submitted through Slate (the online Admissions site). Any requirements not submitted on Slate should be sent directly to the Graduate Program Administrator.

### 4.3.1 Application Requirements

- Minimum 90 credits completed (typically second semester junior year)
- Minimum 3.5 GPA to be considered
- Submit the Co-Terminal Application with all sections completed
- Submit a 4<sup>th</sup> and 5<sup>th</sup> year course plan
- Submit a copy of your Degree Works report
- Submit two (2) letters of recommendation (at least one must be from faculty)
- Submit a resume
- Submit a well-written Statement of Background and Goals
- Submit a completed Master's Plan of Study

**Deadline to apply:** November 1<sup>st</sup> if your normal BS graduation is in the spring; April 15<sup>th</sup> if your normal BS graduation is in the fall.

Co-terminal students can pursue either the thesis or non-thesis track, but the MS non-thesis is recommended for most students. If you wish to apply for the MS with thesis program, you will need to identify a research advisor before your application will be considered. Non-thesis track students will automatically be advised by the GPD for the Master's program.

### 4.3.2 Co-Terminal FAQ's

1. Can I receive both undergraduate financial aid and graduate TA/RA aid?

No. Co-terminal students cannot receive graduate financial aid. You should speak with the Graduate Program Administrator about applying for the traditional Master's program if you receive a verbal graduate financial aid offer and are uncertain about how to proceed.

2. Do I have to file a FAFSA for my 5th year to get the undergraduate aid?

Yes. You must file a FAFSA if you receive need-based aid.

3. When do I receive my B.S. degree?

You will receive BS and MS degrees once you have satisfied the requirements of each degree program. You should file a degree application with the Office of the Registrar for the BS degree at the beginning of the semester in which you will actually graduate. See the [academic calendar](#) for deadline information.

4. Can I use a course for both my undergraduate and graduate degree?

No. The credits applied toward satisfying requirements of the undergraduate degree cannot be used to satisfy the requirements for the Master's degree.

5. I finished my 8th semester but decided not to continue in the Co-Term program. How do I receive my BS degree?

You must formally withdraw from the co-terminal program via the [Graduate Student Request for Change of Status](#) form. You must then file a Degree Application for the next graduation date. Rensselaer has three official graduation dates - the end of August, the end of December, and the end of May.

6. Can I still designate courses as Pass/No Credit?

Co-terminal students are subject to graduate degree program guidelines after they have earned the minimum number of credits required for their bachelor's degree. Any courses taken after a student has reached the minimum will be subject to graduate level policies, and graduate policies prohibit designating a graduate course as Pass/No Credit.

7. Can I participate in the Commencement ceremony with my class?

You must meet the criteria for participation and file a petition, available in the Registrar's Office.

## 4.4 MS Focus Areas

A student pursuing an MS, whether with or without thesis or through the MS co-terminal program, can optionally add an MS Focus Area. A focus would be satisfied with 3 ECSE concentration courses, at least two of these ECSE courses need to be at the 6xxx level, and the third could be an ECSE 4xxx or ECSE 6xxx course. The focus courses need to be chosen from the list of Focus Area Courses in the respective Focus Area, as listed below. Choosing a focus area is optional, i.e., an MS (with or without thesis) or an MS co-term does not have to declare a focus area.

### 4.4.1 Focus Areas

Select **at least three courses** from the concentration list below, **two of which must be at the 6xxx level**, for a total of at least 9-credits. Course substitutions are allowed with approval of advisor and GPD.

#### 1. Control and Automation

Students must pass ECSE 6400: Systems Analysis Techniques and at least two other courses from the list below, one of which must be at the 6xxx level. Course substitutions are allowed with approval of advisor and GPD.

ECSE 6420 Nonlinear Control Systems

ECSE 6440 Optimal Control Theory

ECSE 6460 Multivariable Control Systems

ECSE 6480 Adaptive Systems

ECSE 6500 Distributed Systems and Sensor Networks (or its equivalence)

ECSE 6170 Modeling and Simulation for CPS

ECSE 6660 Internetworking of Things

ECSE 4440 Control Systems Engineering

ECSE 4760 Real Time Control & Communication (Lab or CE Elective)

ECSE 4170 Modeling & Simulation of Cyberphysical Systems

ECSE 4090 Mechatronics (Lab or CE Elective)

Note: Students cannot get credits for both ECSE 4170 and ECSE 6170

## **2. Robotics**

Students must pass ECSE 6470: Robotics I or ECSE 4480 Robotics I (with preference for ECSE 6470). Students must also pass at least two other courses from the list below, one of which must be at the 6xxx level. Course substitutions are allowed with approval of advisor and GPD.

ECSE 6490 Robotics II  
ECSE 6400 Systems Analysis Techniques  
ECSE 6420 Nonlinear Control Systems  
ECSE 6170 Modeling and Simulation for CPS  
ECSE 6650 Computer Vision  
ECSE 6850 Introduction to Deep Learning

ECSE 4490 Robotics II  
ECSE 4850 Intro to Deep Learning  
ECSE 4170 Modeling & Simulation of Cyberphysical Systems  
ENGR 4710 Manufacturing Process and System Lab I (Lab Elective)  
Note: Students cannot get credits for both ECSE 4480 and ECSE 6470  
Students cannot get credits for both ECSE 4490 and ECSE 6490  
Students cannot get credits for both ECSE 4170 and ECSE 6170

## **3. Information and Decision Sciences**

ECSE 6510 Introduction to Stochastic Signals and Systems  
ECSE 6520 Detection and Estimation Theory  
ECSE 6530 Information Theory and Coding  
ECSE 6965 Introduction to Deep Learning

ECSE 4840 - Introduction to Machine Learning  
ECSE 4850 – Intro to Deep Learning  
ECSE 4810 – Intro to Probabilistic Graphical Models  
ECSE 4740 – Parallel Computing  
ECSE 4760 – Real Time Control & Communication  
ECSE 4962 - Trustworthy Machine Learning  
ECSE 4964 - Distributed Machine Learning

## **4. Computer Vision and Imaging**

ECSE 6510 Introduction to Stochastic Signals and Systems  
ECSE 6610 Pattern Recognition  
ECSE 6650 Computer Vision  
ECSE 6965 Introduction to Deep Learning

ECSE 4540 – Introduction to Image Processing  
ECSE 4620 – Computer Vision for Visual Effects  
ECSE 4750 - Computer Graphics  
ECSE 4850 - Intro to Deep Learning  
ECSE 4961/6650 - Computer Vision

## **5. Communication and Network Science**

ECSE 6510 Stochastic Signals and Systems  
ECSE 6520 Detection and Estimation Theory  
ECSE 6530 Information Theory and Coding  
ECSE 6560 Digital Communications  
ECSE 6660 Internetworking of Things

ECSE 4660 – Internetworking of Things  
ECSE 4670 – Computer Communication Networks  
ECSE 4520 – Communication Systems  
ECSE 4530 - Digital Signal Processing  
ECSE 4560 - Digital Communications

Note: Students cannot get credits for both ECSE 6660 and ECSE 4660.

## **6. Power Systems**

ECSE 6050 Advanced Power Electronics  
ECSE 6110 Power Engineering Analysis  
ECSE 6120 Power Quality  
ECSE 6180 Advanced Power System Modeling and Control  
ECSE 6140 Power Generation Operation and Control  
ECSE 6170 Modeling and Simulation of Cyber-Physical Systems  
ECSE 6260 Semiconductor Power Devices  
ECSE 6995 Renewable Energy

ECSE 4130 – EPE Laboratory  
ECSE 4080 – Semiconductor Power Electronics  
ECSE 4110 – Power Engineering Analysis  
ECSE 4120 – Electromechanics  
ECSE 4170 – Modeling & Simulation of Cyberphysical Systems

## **7. Computer System Design**

ECSE 6050 Advanced Electronic Circuit  
ECSE 6680 Advanced VLSI Design  
ECSE 6960 Advanced Computer Systems

ECSE 4770 – Computer Hardware Design  
ECSE 4040 – Digital Electronics  
ECSE 4220- VLSI Design  
ECSE 4250 – IC Process & Design

## **8. Microelectronics and Photonics**

ECSE 6230 - Semiconductor Devices and Models I  
ECSE 6210 Advanced Device Concepts  
ECSE 6220 Physical Found. of Solid-State Devices  
ECSE 6310 Fund. of RF/Microwave Engineering  
ECSE 6290 Semiconductor Devices and Models II

ECSE 6300 IC Fabrication Laboratory  
ECSE 6200 - Semiconductor Device Characterization  
ECSE 6050 Advanced Electronic Circuit  
ECSE 6270 Optoelectronics  
ECSE 6280 Light Emitting Diodes

ECSE 4220 – VLSI Design  
ECSE 4040 - Digital Electronics OR ECSE 4030 - Analog Electronics  
ECSE 4250 - IC Processing and Design  
ECSE 4370 – Optoelectronics Technology  
ECSE 4380 – Fundamentals of Solid State Lighting  
ECSE 4080 - Semiconductor Power Electronics  
ECSE 4720 – Solid State Physics (cross-listed with PHYS 4720)

## **9. Power Electronics**

ECSE 6230 Semiconductor Devices and Models I  
ECSE 6260 Semiconductor Power Devices  
ECSE 6200 Semiconductor Device Characterization  
ECSE-6090 Advanced Power Electronics

ECSE 4220 – VLSI Design  
ECSE Electives (take two from list)  
ECSE 4030 – Analog IC Design  
ECSE 4040 – Digital Electronics  
ECSE 4050 – Advanced Electronics  
ECSE 4310/ECSE 6130 - Fundamentals of RF/Microwave Engineering

## 5 General Departmental and Institute Requirements

### 5.1 Academic Integrity

As a member of an academic community, a high standard of academic conduct and integrity is expected of you. All graduate students must have a clear understanding of Rensselaer's Academic Integrity Policy and follow it at all times. Please access the [Academic Integrity Brochure](#) for more information and definitions of what constitutes academic dishonesty including Academic Fraud, Collaboration, Copying, Cribbing, Fabrication, Plagiarism Sabotage, Substitution, and others. Self-Plagiarism is treated very seriously at RPI, please see [relevant OGE policy](#). An example of Self-plagiarism is using your own previously published work verbatim without indicating via chapter attributions that you are doing so. Your research should be accurate and the contributions of others must be clearly documented according to well-established practices. It is dishonest and unacceptable for you to represent another scholar's ideas or words as your own. Academic dishonesty is taken seriously by the Rensselaer community, and failure to comply with the academic code of conduct will result in disciplinary action, including the possible denial of your degree.

### 5.2 Academic Plan of Study

The graduate program is flexible and affords each student an opportunity to plan a course of study suited to his or her own objectives. To assure a coherent program in accord with the student's maturing capacities and goals, each student is to maintain, with the adviser's assistance, a Plan of Study (POS) for the degree for which he or she is studying. A POS is a form that lists the courses and thesis credits needed to satisfy the degree requirements. The Department requires all new students to file their first POS during their first semester.



A Plan of Study lists all of the courses and thesis credits needed to satisfy one's degree requirements. You cannot graduate or receive financial aid without an up-to-date Plan of Study on file. It is therefore important that you update your PoS whenever you deviate from the Plan currently on file.

The form can be accessed from the Graduate School's website [here](#), under "Forms" and in JEC 6003. Updated forms with pre-set templates have also been placed on the ECSE website on the [Forms and Information](#) tab. Once it is completed, it should be signed by the student and the academic adviser (who must be a full-time ECSE faculty member). It is then submitted to the ECSE Graduate Program Administrator in JEC 6003 for processing, including obtaining the signature of the ECSE Graduate Program Director.

Please note that the student must update the Plan of Study whenever changes occur to the previously submitted plan. The Plan of Study must satisfy the program requirements described in the corresponding Program Requirements section of this Handbook.

### 5.3 Registration Requirements

Rensselaer Polytechnic Institute requires fellowship holders and graduate assistants to register for a minimum number of credits each semester. The full-time load for a graduate student is 12 to 16 credit hours each term. The only exception to this requirement is for students serving as teaching assistants. TA's may register for a minimum of nine (9) credits to maintain their full-time status. The Department encourages all ECSE students to register for a total of 16 credits per term. Each student should simply

register for the courses approved by his or her advisor, and the remaining credits should be thesis or dissertation credits. This will ensure that you maintain a full academic load even if you need to drop a course at some point in the semester. **Students who register for less than a full academic load jeopardize their student status, their visa status, and their financial aid.** Please be very mindful of the add deadline (typically two weeks after the semester begins), as the Graduate School does not approve late add requests. You will not be allowed to add any courses beyond the add deadline, not even thesis credits. If you have enough credits to drop a course and stay at full-time status, the deadline is eight (8) weeks after the start of the semester, **otherwise do not drop courses after the add deadline.**



Falling below a full academic load can jeopardize your visa, academic status, and financial aid. To avoid potential issues, the Department encourages you to register for 16 credits every semester that you are a full-time student. Simply register for the courses approved by your Advisor and all remaining credits should be thesis credits.

### 5.3.1 Summer Administrative Registration (SAR)

Summer Administrative Registration (SAR) is a no-charge registration requirement for graduate students who will be receiving a stipend over the summer or graduating in the summer semester. Students taking a credit-bearing course or research credits should not register for SAR.

### 5.4 Transfer Credit

Transfer credits must be approved by the ECSE Department, the Graduate School, and the Registrar's Office before they can be applied towards the degree. No more than six (6) credits may be transferred toward the master's degree as the residence requirement for the master's degree is 24 credit hours; no more than 15 credits may be transferred towards the 72-credit doctoral degree. Additionally, only courses completed with a grade of B or better can be transferred, and the credits must meet the requirements for the degree as outlined in this handbook. To initiate the transfer credit approval process, you must take the following steps:

1. Complete the [transfer credit approval form](#).
2. Obtain a syllabus of the course you wish to transfer AND a syllabus for the Rensselaer equivalent course, and have these evaluated by the corresponding Rensselaer department. For example, if you want to transfer a Math course, you will need the approval of the Rensselaer Math Department. If you want to transfer an ECSE course, the course syllabus should be evaluated by an ECSE faculty member.
3. Once departmental approval is obtained and the Rensselaer equivalent is determined, obtain your advisor's approval for the transfer of the course.
4. Update your Plan of Study so that it includes the transfer courses. Both student and advisor must sign the POS.
5. Submit the syllabi, the POS, and the transfer credit form to the department Administrator to be reviewed by the Graduate Program Director.
6. The signed transfer credit approval forms will be forwarded to the Graduate School for the Dean's consideration.

### 5.5 Degree Clearance

To receive a degree at the end of any semester, the student must be registered that particular semester, have an up-to-date Plan of Study on file, successfully complete all of the credits listed on his

or her Plan of Study (min. 3.0 GPA), submit a degree application, and receive approval of the thesis (if applicable) by the Graduate School. The thesis (if any) must be submitted to the Graduate School Office by the date specified in the Institute calendar.

## 5.6 Faculty Advisor Designation

New students have up to **six (6) weeks** after the academic semester begins to identify, by mutual agreement between the student and a faculty, a faculty advisor. In the interim, students will have the opportunity to meet with a faculty member from their area of specialization during a temporary advising session that takes place the same day as Orientation. Once an advisor is identified, **the student will be asked to submit an Advisor Form to the Graduate Program Administrator**. It should be completed and signed by both the student and their faculty advisor. We encourage you to meet with multiple faculty members to determine the best match. Please access the [Faculty Profiles](#) on our website.

## 5.7 Doctoral Student Yearly Review Form (DSYR)

The Graduate School specifies that PhD students meet with their advisor each spring semester to review academic progress, update the plan of study on file, and complete and file a Doctoral Student Yearly Review (DSYR) form. The form is to be completed by the student and advisor, noting expectations, academic progress, and dates when milestones will be met. Once completed and signed, the forms are to be submitted to the ECSE Graduate Services Office for review, which, if approved, will be forwarded by the department to the Office of Graduate Education (OGE). OGE will keep the DSYRs on record to evaluate progress through the course of the degree.

## 5.8 Departmental Seminars (Mercer Lab Series)

All graduate students are required to attend bi-weekly departmental seminars as part of their education. Seminars typically fall on Wednesdays from 4-5 pm. Students are excused from seminars if they (1) have a regularly scheduled class that meets during the seminar timeslot or if (2) their TA assignment conflicts with the seminar timeslot.

## 5.9 Financial Aid

Financial aid is available in the form of Teaching Assistantships (TA), Research Assistantships (RA), and Fellowships. The continuation of your award is contingent upon your academic performance and your teaching work, if you have a TA assignment. ECSE graduate students are expected to maintain a grade point average of 3.0 or better.

### 5.9.1 Teaching Assistantships

A Teaching Assistantship provides a stipend and full tuition. For incoming students, the Graduate Teaching Assistantship is the most common form of aid. The Department deems this role a very important one, both for the contribution to departmental teaching needs and also because it enhances a graduate student's ability to provide mentorship, an invaluable preparation for any career. Students holding a Teaching Assistantship are highly encouraged to read the [TA Best Practices Guide](#) at the [Forms and Information](#) tab of the ECSE website.

#### 5.9.1.1 Teaching Assistant Evaluation

Teaching Assistants will be evaluated based on feedback from the students who were in a class where the student served as the TA as well as the course instructor for this class. An example of the TA evaluation form by instructors is included in the Appendix. Continuation and further assignment as TA is subject to satisfactory performance.

## 5.9.2 Research Assistantships

A Research Assistantship provides a stipend and full tuition. The availability of Research Assistantships depends upon the research needs of individual professors' research programs. It is governed by contract requirements. Research assistantships are normally extended for the academic year, and in many cases, summer support is often also available.

Both types of assistantship are provided with the expectation that students will approach their duties with responsibility and professionalism befitting the reputation of RPI.

## 5.9.3 Fellowships

Students are encouraged to seek external fellowship funding as there are a multitude of fellowships that offer a higher stipend, networking opportunities, job training opportunities, prestige, etc. Please feel free to access the Graduate School's fellowship page on [External Fellowships](#)

## 5.9.4 Summer Support

Most students are supported via research assistantships during the summer. In 2022, the minimum summer stipend was \$12,225.

## 5.10 Residency Requirement and Time Limits

A student working towards a master's degree must complete a minimum of 24 credit hours at Rensselaer. A student working towards a doctoral degree is required to take at least 48 credits of course and/or dissertation work beyond the BS degree at Rensselaer.

### 5.10.1 Time Limit for students pursuing a Master's degree

For full-time students pursuing a master's degree, all work must be completed within two and one-half years. Full-time students not fulfilling the master's requirements by the end of two and one-half years will be dismissed unless the Graduate School has given advance approval for additional time to complete the degree. Extensions are rare and are granted only for the most compelling reasons.

Part-time students must complete all work for the master's degree within three calendar years of the original admission date. Extensions may only be granted if the student is in good academic standing and has an acceptable Plan of Study. Working professionals must petition and receive approval from the Dean of Graduate Education.

### 5.10.2 Time Limit for students pursuing a Doctoral degree

For students entering without a master's degree, all work for the doctorate must be completed within seven years. Students entering with a master's degree in their field of study must finish all degree requirements for the PhD within a five-year time period. Students who have not met their applicable time limit will be dismissed from the program unless the Graduate School has given advance approval for additional time to complete the degree. Extensions are extremely rare and are only granted for the most compelling reasons. Students should contact the Graduate Program Administrator if there is any concern about meeting the deadline.

Individuals who leave Rensselaer without obtaining an authorized leave of absence, and who have not requested an extension before the time limit, will be dismissed from the program.

## 5.11 Housing

Graduate students arrange housing on their own, but you should know that there is an off-campus housing development exclusively for Rensselaer graduate students and graduate-level affiliates (post-doctoral fellows and visiting scholars). The [Rensselaer Graduate Community at City Station](#) was

developed to make locating and entering housing at Rensselaer a hassle-free process and is within walking distance of the campus. Students who choose City Station enjoy Rensselaer services such as the Rensselaer Shuttle and Rensselaer Public Safety, even though they reside off-campus in a private community. City Station West and City Station East offer two, three, and four bedrooms, and furnished suites for single students, whereas City Station South houses married couples and families. City Station South suites are unfurnished. At each location, utilities and internet are included in the rent, and each suite includes air conditioning, dishwasher, washer and dryer, and 24-hour video monitoring. All residents are provided off-street parking at no cost and access to an on-site exercise facility. Various retail outlets, including a coffee shop, sandwich shop, full service restaurant, and a hair salon are located on the first floors of West and East. For additional information, you may contact the [Office of Student Living and Learning](#).

## 5.12 Graduate Center

The Graduate Center is housed within the Office of Graduate Education and was created as a service to graduate students, including co-terminal students, who would prefer to discuss an academic or personal issue on a confidential basis. This sort of consultation is characteristic of an Ombuds' office and is designed to confidentially, impartially, and informally assist students in resolving issues that may arise over an interpersonal dispute or other personal situation affecting their educational progress. The center also helps eligible students identify other campus offices and professionals who may be better equipped to assist them. Please go to <https://info.rpi.edu/graduate-education/graduate-ombudsperson> for additional information or contact Ms. Jenni Mullet at 518-276-8433.

## 5.13 ECSE Graduate Students Council

The ECSE graduate student council was founded in Spring 2019. The council members, including the President, Treasurer and Administrator, are elected by the ECSE graduate students. The council acts as a voice representing the graduate student body to relay any concerns or issues to the department. Its objectives include improving the graduate student experience and advising the department leadership on the graduate student views of various policies. Notable recent undertakings of the council include planning and overseeing the renovation of the Flip-Flop lounge and organizing mixers to promote interactions between graduate students with different research interests. The council regularly organizes discussion sessions in each of the core research areas in our department, and helps assist first and second-year doctoral candidates in preparation for the doctoral qualifying exam (DQE). We invite you to run for election to the leadership positions of the council, and/or to participate actively in its activities.

## 5.14 General Links:

ECSE website: <http://www.ecse.rpi.edu/>

Advising & Learning Assistance Center: <https://info.rpi.edu/advising-learning-assistance/>

Career and Professional Development Center: <http://www.rpi.edu/dept/cdc/>

Co-Op / Internships: <http://www.rpi.edu/dept/cdc/students/experience/coop/index.html> Course Catalog: <http://www.rpi.edu/academics/catalog/>

Registrar Forms: <http://srfs.rpi.edu/update.do?catcenterkey=29>

Student Information System: <http://sis.rpi.edu/>

Office of Graduate Education: <http://gradoffice.rpi.edu/setup.do>

Graduate Forms: <http://gradoffice.rpi.edu/update.do?catcenterkey=20>

## 6 Appendix

### 6.1 Application for ECSE Research Qualifying Examination

#### ECSE RQE Application

**Student Name (Last, First):** \_\_\_\_\_ **RCS ID:** \_\_\_\_\_

First Semester as PhD Student: \_\_\_\_\_ Highest Degree: (BS or MS) \_\_\_\_\_

RQE Semester Requested (circle one): Fall/Spring Year: 2 0 \_\_ \_

**Major concentration Area (See Section 3.2.1.2):** \_\_\_\_\_

**Minor concentration Area (See Section 3.2.1.2):** \_\_\_\_\_

#### **Representative List of Papers (3):**

Note: Papers should be chosen from mainstream archival journals or flagship conferences. RQE committee is not required (and is unlikely) to choose from this list, but rather will use it as an indication of the general area of the student's intended research. The papers should jointly represent/cover a cohesive or closely related research area/topic.

[1]

[2]

[3]

Student Name: \_\_\_\_\_

Student Signature: \_\_\_\_\_ Date: \_\_\_\_\_

PhD Advisor Name: \_\_\_\_\_

PhD Advisor Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### 6.2 RQE Assignment to Doctoral Student

Dear xx,

Date: xx/xx/xx

You are required to provide a 5-page report synthesis of the papers listed below, and outlining possible future research directions in the relevant field. The report is due by email to Ms. Kelley Kritz no later than 11:59 am on xx/xx/xx.

**Scheduling your RQE oral exam:** You need to contact your RQE committee members to schedule a 1-hour time slot to conduct the exam during the 2-week period xx/xx/xx – xx/xx/xx. It is your responsibility to reach out to the faculty and to find a time that works for all members, e.g. by using a Doodle Poll. Please reach out to the faculty immediately.

**RQE Examining Committee:** Your examining is composed of the following faculty:

Examiner 1: Prof.

Examiner 2: Prof.

Observer and Head: Prof.

**Assignment:** The following papers have been assigned to you by the RQE Committee. The papers jointly represent/cover a cohesive or closely related research area/topic.

[1]

[2]

**Report Format:** The report must be no longer than 5 pages, not including the reference list. It should include an abstract, introduction, and conclusion sections, use font no smaller than 11 points Times, and be single space, and each page needs to be numbered. You can use Latex, Word, or other similar document preparation software, but the final report must be submitted as an Adobe document.

**Presentation Format:** On the day of the oral RQE exam, you will meet with the RQE faculty examining committee at the scheduled location and time. You will start with a 20 minute presentation, followed by questions from the committee.

**Assessment:** Your RQE will be assessed based on the following: 1) Understanding of relevant fundamentals. 2) Understanding of related literature. 3) Clarity and completeness of written document. 4) Quality of oral presentation. 5) Ability to field questions.

Good luck!

GPD.

### 6.3 RQE Student Evaluation by RQE Faculty

#### RQE Student Evaluation by RQE Faculty

Student Name: \_\_\_\_\_

Please enter a score between 2 and 5 for the student examined:

2: inadequate level of performance

3: performance is marginal, would need to improve by quite a bit

4: good performance, should be able to prepare a solid dissertation

5: outstanding performance, should become one of our stars

- Understanding of relevant fundamentals \_\_\_\_\_
- Understanding of related literature \_\_\_\_\_
- Clarity and completeness of written document \_\_\_\_\_
- Quality of oral presentation \_\_\_\_\_
- Ability to field questions \_\_\_\_\_

Overall Recommendation (Pass/Fail): \_\_\_\_\_

Comments by faculty examiner:

\_\_\_\_\_  
\_\_\_\_\_

For RQE Chair:

Exam seemed reasonable with no observed exceptions(Yes/No): \_\_\_\_\_

If No, please add comments below:

\_\_\_\_\_  
\_\_\_\_\_

Faculty Name: \_\_\_\_\_ Date: \_\_\_\_\_

## 6.4 RQE Student Evaluation by Faculty Advisor

### RQE Student Evaluation by Faculty Advisor

Name of Student: \_\_\_\_\_

Research Advisor: \_\_\_\_\_

A. Compared to other graduate students you have known who have been at an equivalent stage of their academic career, how would you score the student with respect to:

- |  | <u>SCORE</u> |
|--|--------------|
| 1. Self-reliance or ability to work with minimum supervision | _____        |
| 2. Creativity or ability to come up with original ideas      | _____        |
| 3. Motivation and dedication to accomplishment               | _____        |
| 4. Ability to communicate in writing                         | _____        |

No plus, minus or fractional scores, PLEASE

Score Values:

- 5 - representative of RPI's best doctoral student
- 4 - representative of a good doctoral student
- 3 - typically of a marginally adequate doctoral student
- 2 - performance less than adequate of that expected of a doctoral student
- 1 - definitely inadequate performance

B. Briefly comment on the likelihood that the student will be able to successfully complete the requirements for a doctorate. Also please comment on any pertinent strengths or weaknesses.

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

## 6.5 Doctoral Student Major/Minor Concentrations

### Doctoral Student Major/Minor Concentrations

Student Name (Last, First): \_\_\_\_\_ RCS ID: \_\_\_\_\_

First Semester as PhD Student: \_\_\_\_\_ Expected DCE Date: \_\_\_\_\_

Major Area: \_\_\_\_\_

	Course Number (e.g. ECSE 6510)	Course Name (e.g. Introduction to Stochastic Signals and Systems)	Semester (e.g. F 2022)	Waiver Requested? (Yes/No)
Course 1				
Course 2				
Course 3				

Minor Area: \_\_\_\_\_

	Course Number (e.g. ECSE 6510)	Course Name (e.g. Introduction to Stochastic Signals and Systems)	Semester (e.g. F 2022)	Waiver Requested? (Yes/No)
Course 4				
Course 5				

Waivers requested (if none, leave blank):

Original Course Name	Equivalent Course Name	Institution	Month/Year Completed	Grade

Student Name: \_\_\_\_\_

Student Signature: \_\_\_\_\_ Date: \_\_\_\_\_

PhD Advisor Name: \_\_\_\_\_

PhD Advisor Signature: \_\_\_\_\_ Date: \_\_\_\_\_

ECSE GPD Approval: \_\_\_\_\_ Date: \_\_\_\_\_

## 6.6 Teaching Assistant Evaluation

### TA EVALUATION FOR SPRING 2020

TA Name: \_\_\_\_\_

Instructor Name: \_\_\_\_\_

Course #: \_\_\_\_\_

Course Title: \_\_\_\_\_

Course Type: \_\_\_\_\_

1 = inadequate, 2 = adequate, 3 = good, 4 = excellent, 5 = outstanding

1. Knowledge of subject	
2. Preparedness	
3. Shows enthusiasm for subject and for teaching	
4. Effective communication with faculty	
5. Provides helpful feedback on course assignments	
6. Provides consistent and fair grading	
7. Effective communication with students	
8. Availability outside of class	
9. Approachable by students	
10. Responsible (show up and get things done on time)	
Score Value:	

#### **Should this TA**

(1) be in this course again?	
(2) be considered for special recognition?	
(3) be discontinued as a TA?	

Other comments:

--

## 6.7 ECSE Fast-Track BS-PhD Application

# ECSE BS/PhD Program Application Instructions

1. Complete the three-page application following this page. This application is the ONLY one you will need for entrance into ECSE's BS/PhD Program.
2. Include a one to two-page resume.
3. Work with undergraduate or prospective BS/PhD Advisor to develop a course plan and plan of study.
4. Send all items to [kritzk@rpi.edu](mailto:kritzk@rpi.edu), with the subject line "BS/PhD Application"; or mail or deliver to:  
  
ECSE BS/PhD Program  
Rensselaer Polytechnic  
Institute JEC-6003  
110 8th Street  
Troy, NY 12180-3590
5. Submit a transcript (unofficial is fine) along with all other paperwork.
6. Ask two faculty members to complete the attached recommendation forms. The recommenders should email their recommendation forms directly to [kritzk@rpi.edu](mailto:kritzk@rpi.edu). It is highly recommended that one of the references be completed by the prospective PhD Research Advisor.

**Requirements**

- Completion of four academic terms
- Overall GPA of 3.5 or above

Please submit the following

- This completed form
- Resume
- College transcripts
- Two letters of recommendation from faculty

**Intended semester of entrance to program**

Spring/Fall/Summer \_\_\_\_\_  
(Circle one) Year

**PLEASE PRINT CLEARLY**

**SEND TO**

Graduate Program Administrator (ECSE)  
JEC 6003

Male  Female

**PERSONAL DATA**

\_\_\_\_\_  
Last Name/Surname First/Given Middle Jr., II, III, etc. Former or Other Names

**Permanent address**

\_\_\_\_\_  
Number and Street or P.O. Box, Rural Route or Apt. No

\_\_\_\_\_  
City State/Province Zip/Postal Code Country

Home Phone ( ) \_\_\_\_\_ Work ( ) \_\_\_\_\_ Fax ( ) \_\_\_\_\_  
Area code or Country/City code Area code or Country/City code Area code or Country/City code

**Temporary mailing address**

\_\_\_\_\_  
Number and Street or P.O. Box, Rural Route or Apt. No.

\_\_\_\_\_  
City State/Province Zip/Postal Code Country

Temporary phone ( ) \_\_\_\_\_ Temporary Work ( ) \_\_\_\_\_  
Area code or Country/City code Area code or Country/City code

Until what date may we reach you at the temporary address? \_\_\_\_\_

Email address \_\_\_\_\_

RIN # **6 6** \_\_\_\_\_

**Citizenship**

- United States citizen
- Permanent Resident of U.S.
- Citizen of \_\_\_\_\_  
Nation

Native Language \_\_\_\_\_

**Check if you are an international applicant.**

**For international applicants only**

**Will you need an I-20 or DS2019 issued?**

- Yes  No
- If yes, which one?  I-20  DS2019

**If you are currently in the United States,**

**please indicate the type of visa you have:**

- F-1  J-1
- Other (please specify) \_\_\_\_\_
- Visa expiration date \_\_\_\_/\_\_\_\_/\_\_\_\_

Country of birth \_\_\_\_\_

Date of birth \_\_\_\_\_

Month/Day/Year

**Optional: How would you describe yourself? (Please check one)**

- American Indian or Alaskan Native
- African American, Black, Afro-Caribbean (non-Hispanic)
- Asian or Pacific Islander
- Hispanic, Latino (including Puerto Rican)
- Mexican American, Chicano
- White, Anglo, Caucasian (non-Hispanic)
- Other (specify) \_\_\_\_\_

**PROGRAM INFORMATION**

Please check your chosen Ph.D. degree program

- Electrical Engineering (ELEC)
- Computer and Systems Engineering (CSYS)

Intended areas of research or specialization, if any (see <https://ecse.rpi.edu/research> for research areas in ECSE)



Last Name/Surname                      First/Given                      Middle                      Jr., II, III, etc.                      Former or Other Names

**ACADEMIC INFORMATION**

A listing of all universities, technical schools, and language training programs you have attended, regardless of whether or not a degree was completed, is required. Grade point average (GPA) must be provided. Incomplete or falsified transcript or GPA information may result in denial of admission.

Name of Institution (MOST RECENTLY ATTENDED)	Dates of Attendance		Major Field	Degree (B.S., M.S., none, etc.)	Received or Expected Mo./Yr.	Overall GPA
	From (Mo./Yr.)	To (Mo./Yr.)				
1. Rensselaer						
2.						

**FINANCIAL AID STATUS FOR FULL-TIME TROY CAMPUS APPLICANTS ONLY (No other financial aid information is required)**

Please indicate the type of Rensselaer financial aid you will require to complete your chosen Doctoral degree upon completion of B.S.

None       Full aid required

If you answer "yes" to either of the following statements, please attach a separate statement.

Have you ever been expelled or suspended from a post-secondary institution?     Yes     No

Have you ever been convicted of a felony?     Yes     No

**CERTIFICATION**

I hereby certify that the information given by me on this application is complete and accurate in every respect, and the information I have submitted as an applicant for admission is my own work. I understand and agree that any misrepresentation may be cause for denial or revocation of admission or subsequent dismissal from Rensselaer.

SIGNATURE OF APPLICANT \_\_\_\_\_ Date \_\_\_\_\_



# Electrical, Computer, and Systems Engineering BS-PhD Program

## LETTER OF RECOMMENDATION FORM

**APPLICANT:** Please send this form with each of your invitations for letters of recommendation.

<b>Student Name</b>	RIN
<b>Areas of Interest</b>	Email Address
	Date Submitted

### BUCKLEY AMENDMENT WAIVER

*The Family Educational Rights and Privacy Act of 1974 (Buckley Amendment)* allows you to access your educational records at Rensselaer. You may waive your right of access to this specific report if you so choose. Your decision to waive or not to waive your right of access will have no bearing on the handling of your application.

**I do      do not      waive my rights to access this report.**

Waiver Signature

Date

### CERTIFICATION

I confirm that I did not write any portion of this recommendation, either in whole or in part, or have any involvement in its drafting or submission.

Certification Signature

Date

**RECOMMENDER:** Please use the following page or a separate sheet for your detailed comments and evaluation.

The student named above has applied for admission to the BS-PhD Program in ECSE.

The Admissions Committee will carefully consider your recommendation as part of the student's application. Please highlight: *academic performance, motivation, maturity, emotional stability, group interaction skills, integrity, reliability, communication, and perseverance, as well as major strengths or weaknesses.*

Thank you for telling us about your experiences with this student. If the student has waived his/her right to access this report above, the information will be treated as confidential.

<b>Recommender's Name</b>	Email Address
<b>Relationship to Applicant</b>	Date Submitted

**How well do you know the applicant?**

**I would rate this candidate's suitability for the BS-PhD Program as:**

**Exceptional**  
(Top 5%)

**Very Good**  
(Top 15%)

**Good**  
(Top 30%)

**Acceptable**  
(Top 50%)

**Not acceptable**  
(Bottom 50%)

**Please use the following space or attach a separate sheet for your more detailed comments and evaluation**  
Please Email completed recommendation to Kelley Kritzk ([kritzk@rpi.edu](mailto:kritzk@rpi.edu))

# Electrical, Computer, and Systems Engineering BS-PhD Program

## LETTER OF RECOMMENDATION FORM

**APPLICANT:** Please send this form with each of your invitations for letters of recommendation.

<b>Student Name</b>	RIN
<b>Areas of Interest</b>	Email Address
	Date Submitted

### BUCKLEY AMENDMENT WAIVER

*The Family Educational Rights and Privacy Act of 1974 (Buckley Amendment)* allows you to access your educational

records at Rensselaer. You may waive your right of access to this specific report if you so choose. Your decision to waive or not to waive your right of access will have no bearing on the handling of your application.

**I do      do not      waive my rights to access this report.**

**Waiver Signature**

**Date**

### CERTIFICATION

I confirm that I did not write any portion of this recommendation, either in whole or in part, or have any involvement in its drafting or submission.

**Certification Signature**

**Date**

**RECOMMENDER:** Please use the following page or a separate sheet for your detailed comments and evaluation.

The student named above has applied for admission to the BS-PhD Program in ECSE.

The Admissions Committee will carefully consider your recommendation as part of the student's application. Please highlight: *academic performance, motivation, maturity, emotional stability, group interaction skills, integrity, reliability, communication, and perseverance, as well as major strengths or weaknesses.*

Thank you for telling us about your experiences with this student. If the student has waived his/her right to access this report above, the information will be treated as confidential.

<b>Recommender's Name</b>	Email Address
<b>Relationship to Applicant</b>	Date Submitted

**How well do you know the applicant?**

**I would rate this candidate's suitability for the BS-PhD Program as:**

**Exceptional**  
(Top 5%)

**Very Good**  
(Top 15%)

**Good**  
(Top 30%)

**Acceptable**  
(Top 50%)

**Not acceptable**  
(Bottom 50%)

**Please use the following space or attach a separate sheet for your more detailed comments and evaluation**  
Please Email completed recommendation to Kelley Kritzk ([kritzk@rpi.edu](mailto:kritzk@rpi.edu))

# BS-PhD                      APPLICANT

## UNDERGRADUATE-GRADUATE PLANNER

**NAME** \_\_\_\_\_ **RIN** \_\_\_\_\_ **UG DEPARTMENT** \_\_\_\_\_

*Please note that any course applied to the undergraduate degree should be labeled UG and any course being applied to the graduate degree should be labeled G. Be sure that the information listed matches what is listed on the Degree Works and Plan of Study. Courses can only be applied to one degree- credits cannot be split or shared between the undergraduate and graduate degrees.*

	<i>Semester (F/S/U)</i>	<i>Year</i>	
UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_

	<i>Semester (F/S/U)</i>	<i>Year</i>	
UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_

	<i>Semester (F/S/U)</i>	<i>Year</i>	
UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_

	<i>Semester (F/S/U)</i>	<i>Year</i>	
UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_

**Please use as many sheets as necessary to map all of your remaining semesters.**

*Semester (F/S/U)      Year*

UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_

*Semester (F/S/U)      Year*

UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_

*Semester (F/S/U)      Year*

UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_

*Semester (F/S/U)      Year*

UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_

*Semester (F/S/U)      Year*

UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_

*Semester (F/S/U)      Year*

UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_

*Semester (F/S/U)      Year*

UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_

*Semester (F/S/U)      Year*

UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_

*Semester (F/S/U)      Year*

UG or G	Course Subject/Number	Course Name	Credit Hours

UG Credits: \_\_\_\_\_ G Credits: \_\_\_\_\_ Total Credits: \_\_\_\_\_



# Rensselaer

Department of Electrical, Computer, and Systems Engineering

## Program Planner

### Doctoral Program in Electrical, Computer, and Systems Engineering

*(for students entering with a bachelor's degree)*

Name \_\_\_\_\_

Entry Term \_\_\_\_\_

#### Graduation Requirements: **72 credits**

√ A minimum of 2/3 of the total course credits listed in the Plan of Study must be at the 6000-6999 level.

ECSE Dissertation is not considered course work credit and does not count toward the 2/3 rule.

√ 3-4 credits in advanced mathematics (4000-6000 level)

√ No more than 15 credits of 4000-level courses can be applied to the overall 72 credit plan of study. This includes applying a MATH course at the 4000-level.

√ No 1000 or 2000 level course may be applied toward the degree.

√ Register for 12-36 credits of dissertation (ECSE-9990) with advisor approval

**\*Students should work with their advisor to determine the best Plan of Study (POS) and be sure to have a total of 72 credits while following the above requirements.**

Course #	Course Title	Credits	Term/Year
<b>I. Advanced Mathematics Course (3-4 cr.)</b>			
MATH-	_____	_____	_____
<b>II. ECSE Courses (exact credit number depends upon I, II, IV)</b>			
ECSE-	_____	_____	_____
ECSE-	_____	_____	_____
ECSE-	_____	_____	_____
ECSE-	_____	_____	_____
ECSE-	_____	_____	_____

**III. External courses from the Schools of Science or Engineering, or additional ECSE courses. (exact credit number depends upon I, II, IV)**

-			
-			
-			
-			
-			

**IV. Dissertation Credits (12-36 cr., exact number depends upon I, II, III)\***

ECSE-9990			

Total Credits: 72 (total courses and credits completed)



Date \_\_\_\_\_

Plan Status \_\_\_\_\_  
New

Revised

Revised  
November 2017

## GRADUATE PLAN OF STUDY INSTRUCTIONS

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### GENERAL

You must submit a Plan of Study (POS) **before end of your second semester in your program**. Your POS is your plan for completing your entire degree. If your plans change after you submit your POS, you can submit an updated version at any time. Most graduate students revise their POS several times before they graduate. Awarding of the degree is based on satisfactory completion of Institute requirement and on satisfactory completion of all courses listed and approval of any transfer credits.

**Submit an updated and revised POS every time you change your coursework or timeline. An incomplete or inaccurate POS will not be approved by OGE. All plans should be typed.**

List all courses that will be applied toward the degree. For every course you list, indicate:

- **Course subject / number / title**
- **Credit hours received for the course** (Students should list these credits in *chronological order of registration*, and should stop listing credits once they have listed the minimum number required for the degree, even if they have earned additional credits beyond the minimum. *Please do not include 0 Credit courses* such as ADMN 6700: Orientation Seminar for Grads.)
- **Semester in which the course has or will be completed**; including the year (i.e. F 2017)
- **Whether the course is required, elective, transfer or waived**
- **Total number of credits** (which should be equal to the number of credits required for the degree: 30, 45, 60, 72, or 90 are the only possible credit totals)

### TRANSFER CREDITS

If a course is listed as a transfer, the transfer credits **must be approved by the department and OGE and on file with the Registrar's Office** before they can be applied toward a degree. You should verify that the Transfer Credit Approval Form and an official transcript showing the completion of the course are on file with the Registrar's Office. Because the residence requirement for the master's degree is 24 credit hours, no more than six credits may be transferred toward the master's degree and they cannot have been used for another degree. Students in a doctoral program not applying a full Master's degree cannot transfer more than 24 credit hours toward a 72 credit hour degree and no more than 42 credits toward a 90 credit hour degree. Students cannot transfer courses from a completed degree earned outside of the Institute to their RPI Master's/PhD program.

### WAIVERS

If a course is listed as waived, it must be replaced by another course to total the appropriate number of credits required for the degree. This does not apply for the M. Arch program.

### MASTER'S DEGREE

The Plan of Study must contain 30 credit hours (45 for the MBA and 60 for the MFA) beyond the bachelor's degree with satisfactory grades.<sup>2</sup> At least half of the total credit hours presented toward the degree must have the suffix numbers 6000-7999, with the further limitation that no more than 15 credits of 4000-4990 courses are allowed (see program for other departmental rules). The master's degree must be completed within two and one-half years. Students enrolled in part-time and Advanced Professional Studies programs must complete the degree within three and one-half years. 2000 level courses cannot be applied towards a master's degree.

### DUAL MASTER'S DEGREE

If you are receiving a dual degree, please list your other degree in the "Dual Degree" field. A POS must be filed simultaneously for both degrees. Please be aware that only six credit hours used for one master's can be applied to a second master's degree. **Courses being "shared" between the two degrees should be marked by an asterisk (\*) after the course title.**

### DOCTORAL DEGREE

The POS must contain 72 credit hours beyond the bachelor's degree (48 must be earned at Rensselaer with satisfactory grades). Some programs require 90 credits (48 must be earned at Rensselaer with satisfactory grades);

please check individual departmental policies. In satisfying degree requirements, at least two-thirds of the total credit hours, excluding thesis, must contain the suffix numbers

6000–7999, with the further limitation that no more than 15 credit hours of 4000-4990 courses are to be allowed for a 72 credit hour doctorate or no more than 21 credit hours of 4000-4999 courses for a 90 credit doctorate. The degree must be completed within seven

years (five years if entering with a Master's degree) of the first course applied to the degree. 2000 level courses cannot be applied towards a doctoral degree. For students entering a PhD program with a relevant Master's degree or who earn a Master's degree along the course of the PhD program: you may apply up to 24 credits toward your PhD for advanced standing. See restrictions for 4000-level courses. For Master's degrees from outside of the Institute, a copy of the transcript must be submitted to OGE with 6000 -level courses and equivalent courses highlighted. Not all credits may be applicable to the two-thirds rule if not at the 6000 level.

#### **NOTE**

In addition to meeting the institute requirements, *the plan must adhere to all departmental regulations.*

After you complete the plan, sign it and meet with your adviser for his/her signed approval. After your adviser approves the plan, forward it to the appropriate person in your department for approval.

When the plan receives departmental approval, send the original to OGE. Upon OGE approval, a copy will be filed with the registrar's office.

#### **<sup>2</sup>SATISFACTORY GRADES**

The average of all grades used for credit toward an advanced degree must be B (3.0) or better. Courses with a D grade cannot be applied to a plan of study.

## 6.8 ECSE Fast-Track BS-PhD Example Curriculum

Electrical Engineering			CSCS			Mechanical Engineering			Chemical Engineering			
FALL SEMESTER (16 credits)			SPRING SEMESTER (17 credits)			FALL SEMESTER (16 credits)			SPRING SEMESTER (17 credits)			
CSCI-1100	Computer Science I	4	ENGR-1200	ENGR-1400	1	ENGR-1200	ENGR-1400	1	ENGR-1200	ENGR-1400	1	
ECSE-1010	Introduction to ECSE	4	MATH-1020	Calculus II	4	ENGR-2350	Embedded Control	4	ENGR-2350	Embedded Control	4	
MATH-1010	Calculus I	4	PHYS-1100	Physics I	4							
IHSS-####	Hum., Arts or Soc. Sci. Elective	4										
Science Elective			Information Sessions			Webinars			Panel/social with current Grad Students			
FALL SEMESTER (16 credits)			SPRING SEMESTER (15 credits)			FALL SEMESTER (16 credits)			SPRING SEMESTER (17 credits)			
ECSE-2610	Computer Comp. & Operations	4	ECSE-2010	Electric Circuits	4	ECSE-2110	Electrical Energy Systems	3	ECSE-2050	Engineering Probability	3	
MATH-2400	Intro. to Differential Equations	4	ECSE-2500	Engineering Probability	3	ECSE-2100	Fields and Waves I	4	ECSE-2100	Fields and Waves I	4	
PHYS-1200	Physics II	4	MATH-2010	Multivariable Calc & Matrix Algebra	4	ECSE-2410	Signals and Systems	3	ECSE-2410	Signals and Systems	3	
Hum., Arts or Soc. Sci. Elective	4	ECSE-2900	ECSE Enrichment Seminar	1	ECSE-2900	ECSE Enrichment Seminar	1	ECSE-2900	ECSE Enrichment Seminar	1	ECSE-2900	ECSE Enrichment Seminar
SUMMER ARCH SEMESTER (16-17 credits)			SUMMER			SUMMER			SUMMER			
ECSE-2110	Electrical Energy Systems	3	ECSE-2050	Intro. to Electronics	4	ECSE-2100	Fields and Waves I	4	ECSE-2100	Fields and Waves I	4	
ENGR-2050	Introduction to Eng. Design	4	ECSE-2100	Fields and Waves I	4	ECSE-2410	Signals and Systems	3	ECSE-2410	Signals and Systems	3	
STSS-4100	Prof Devt- Tech Issues & Solutions	2	ECSE-2410	Signals and Systems	3	ECSE-2900	ECSE Enrichment Seminar	1	ECSE-2900	ECSE Enrichment Seminar	1	
Hum., Arts or Soc. Sci. Elective	4	ECSE-2900	ECSE Enrichment Seminar	1	ECSE-2900	ECSE Enrichment Seminar	1	ECSE-2900	ECSE Enrichment Seminar	1	ECSE-2900	ECSE Enrichment Seminar
Free Elective	3 or 4	ECSE-2900	ECSE Enrichment Seminar	1	ECSE-2900	ECSE Enrichment Seminar	1	ECSE-2900	ECSE Enrichment Seminar	1	ECSE-2900	ECSE Enrichment Seminar
<b>Optional ARCH Summer Research</b>			<b>Summer Research Rotation</b>			<b>Summer Research Rotation</b>			<b>Summer Research Rotation</b>			
FALL SEMESTER (16-17 credits)			SPRING SEMESTER (13-19 credits)			FALL SEMESTER (16-17 credits)			SPRING SEMESTER (13-19 credits)			
ECSE-2210	Microelectronics Tech	3	ECSE-2210	Microelectronics Tech	3	ECSE-2210	Microelectronics Tech	3	ECSE-2210	Microelectronics Tech	3	
ECSE-4900	Multidisc. Capstone Design	3	ECSE-4900	Multidisc. Capstone Design	3	ECSE-4900	Multidisc. Capstone Design	3	ECSE-4900	Multidisc. Capstone Design	3	
ENGR-4010	Prof Development - Leadership	1	ENGR-4010	Prof Development - Leadership	1	ENGR-4010	Prof Development - Leadership	1	ENGR-4010	Prof Development - Leadership	1	
Lab Elective	3	Lab Elective	3	Lab Elective	3	Lab Elective	3	Lab Elective	3	Lab Elective	3	
Restricted Elective	3	Restricted Elective	3	Restricted Elective	3	Restricted Elective	3	Restricted Elective	3	Restricted Elective	3	
Technical Elective	3	Technical Elective	3	Technical Elective	3	Technical Elective	3	Technical Elective	3	Technical Elective	3	
<b>B.S. Degree received - May</b>			<b>Summer Assessment (August)</b>			<b>Attend events</b>			<b>Attend events</b>			
Attend events			Graduate Experience Social			Graduate Experience Social			Graduate Experience Social			
Graduate Experience Social			Research			Research			Research			
Research			Spring Admits determined			Spring Admits determined			Spring Admits determined			
Spring Admits determined			FALL SEMESTER			FALL SEMESTER			FALL SEMESTER			
FALL SEMESTER			Research			Research			Research			
Research			Course work			Course work			Course work			
Course work			FALL SEMESTER			FALL SEMESTER			FALL SEMESTER			
FALL SEMESTER			Research			Research			Research			
Research			Course work			Course work			Course work			
Course work			FALL SEMESTER			FALL SEMESTER			FALL SEMESTER			
FALL SEMESTER			Research			Research			Research			
Research			Course work			Course work			Course work			
Course work			Total Dissertation Credits:			Total Dissertation Credits:			Total Dissertation Credits:			
Total Dissertation Credits:			Total Course Credits:			Total Course Credits:			Total Course Credits:			
Total Course Credits:			Overall Credits:			Overall Credits:			Overall Credits:			
Overall Credits:			*PhD credits must be a total of 72, but do not have to be exactly shown as above (See below for additional details)			*PhD credits must be a total of 72, but do not have to be exactly shown as above (See below for additional details)			*PhD credits must be a total of 72, but do not have to be exactly shown as above (See below for additional details)			
*PhD credits must be a total of 72, but do not have to be exactly shown as above (See below for additional details)			Two thirds of total credit hours (excluding thesis credits) at the 6000-level			Two thirds of total credit hours (excluding thesis credits) at the 6000-level			Two thirds of total credit hours (excluding thesis credits) at the 6000-level			
Two thirds of total credit hours (excluding thesis credits) at the 6000-level			No more than 15 4000-level credits			No more than 15 4000-level credits			No more than 15 4000-level credits			
No more than 15 4000-level credits			A minimum of 12 and a maximum of 36 dissertation thesis credits			A minimum of 12 and a maximum of 36 dissertation thesis credits			A minimum of 12 and a maximum of 36 dissertation thesis credits			
A minimum of 12 and a maximum of 36 dissertation thesis credits			One Math elective			One Math elective			One Math elective			
One Math elective			No more than 15 transfer credits			No more than 15 transfer credits			No more than 15 transfer credits			
No more than 15 transfer credits			No more than three credits of Independent Study			No more than three credits of Independent Study			No more than three credits of Independent Study			
No more than three credits of Independent Study			No 1000- or 2000- level courses may be applied towards the degree			No 1000- or 2000- level courses may be applied towards the degree			No 1000- or 2000- level courses may be applied towards the degree			
No 1000- or 2000- level courses may be applied towards the degree												

(This can also be seen larger on the website.)