

Master's Program Handbook

ECE Graduate Committee
Electrical and Computer Engineering
School of Engineering and Technology
Indiana Univ. Purdue Univ. Indianapolis

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1 Introduction

This handbook contains the requirements and regulations for the Master's degree programs offered by the Department of Electrical and Computer Engineering (ECE) at Indiana University Purdue University Indianapolis (IUPUI). Included is information about the types of Master's degrees, degree requirements, minimum academic standards, the advisory committee, plan of study (POS), registration, and the Master's thesis.

Our engineering degree programs are administered jointly by IUPUI and Purdue University at West Lafayette. Your degree is granted by Purdue University upon successful completion of all degree requirements in the Department of Electrical and Computer Engineering at IUPUI. The Purdue School of Engineering and Technology Office of Graduate Programs works closely with the Purdue University Graduate School in West Lafayette as well as with the IUPUI Graduate Office in a campus-wide coordination and administration of graduate engineering programs. Additionally, if you are an international student you will have contacts with the Office of International Affairs at IUPUI regarding visas and immigration requirements.

A strength of the academic component of the Master's program is that each student creates his/her own plan of study (POS), a document that defines the student's academic program. The degree requirements, which have elements of depth and breadth, afford flexibility for developing a POS that best suits your needs and goals. The information in this handbook is intended to assist you in setting up your POS and advisory committee. In developing your POS, you should consult with your advisory committee, in particular your major advisor. Your POS requires the approval of all advisory committee members, as well as the approval of the ECE Graduate Committee, and the Graduate School.

Students in the Master's program must identify an ECE primary area from the four defined areas: Automatic Control, Robotics, Power and System (AC); Communication and Signal Processing (CS); Computer Engineering (CE); and VLSI and Circuit Design (VC). Within the ECE graduate program, the primary area is defined as the one of the above four areas closest to your interests or thesis research. Courses outside of your primary area are to be considered as part of one or more related areas. On your plan of study the courses are to be identified as belonging to either the ECE primary or ECE related areas.

In addition to this handbook, there are other resources available in the Graduate School Office and the ECE Office, as well as on the ECE Graduate website ¹.

2 Master's Degrees

The Department of Electrical and Computer Engineering offers the following Master's degrees:

- Master of Science in Electrical and Computer Engineering (MSECE)
- Master of Science in Engineering (MSE)
- Master of Science (MS)

The MSECE, MSE and MS are awarded to students who have been accepted into and satisfied the requirements of the ECE Master's program. The specific degree awarded depends on the undergraduate background of the student and the student's willingness to make up deficiencies (if any) in undergraduate ECE background as outlined below:

¹<http://et.engr.iupui.edu/departments/ece/grad>

	Thesis Option	Non-thesis Option
ECE Core Courses	At least 6 cr hrs	
Math <i>See Appendix F</i>	At least 3 cr hrs	
Primary Area	At least 15 cr hrs	
Masters Thesis	9 hrs of ECE 698	NONE
Project	NONE	At most 3 hrs of ECE 696/ECE 697
Total	A total of 30 hrs	

Table 1: Summary of Thesis and Non-thesis Options

The MSECE degree is awarded to students who satisfy the requirements of the ECE program and any one of the following conditions:

- An undergraduate degree in CmpE, ECE, or EE from an ABET² accredited institution.
- An undergraduate degree in Computer Science, if the student's course work includes junior or senior level courses in a) operating systems, b) compiling, and c) computer architecture. Prerequisite material for these courses is implicitly required.
- Any other undergraduate degree, plus satisfaction of a specified set of ECE undergraduate requirements. Refer to Appendix A for the detailed description of ECE undergraduate requirements.

The MSE degree is awarded to students who satisfy the requirements of the ECE program requirements, and who hold an undergraduate degree in engineering (other than CmpE, ECE, or EE) from an ABET accredited institution, and who have not satisfied the specified set of ECE undergraduate requirements (Appendix A).

The MS degree is awarded to students who satisfy the requirements of the ECE program degree requirement, and who hold an undergraduate degree in a non-engineering discipline, and who have not satisfied the specified set of ECE undergraduate requirements.

2.1 Thesis or Non-thesis Options

Either the thesis or non-thesis option must be selected for the ECE and the interdisciplinary program. Requirements for both options are summarized in Table 1, and the detailed requirements are described in Section 3. The ECE department strongly recommends full-time students select the thesis option in order to be considered for financial aid and assistantships.

3 Degree Requirements

3.1 Total and ECE Graduate-Level Credit Hours

All students must complete a total of 30 credit hours selected by the student and approved by the advisory committee. The requirements are the same for all MS degrees, at least 15 credit hours must be ECE graduate courses. One 3 credit hour course from the list in Appendix B is required to meet the Mathematics requirement, see Section 3.4). No more than 3 additional credit hours can be taken outside of the ECE department (see Section 6.3) that can be used on your MSECE plan of study. Pass/No-Pass grades are not permitted for courses on the Master's plan of study.

3.2 Breadth Requirement

The area core courses cover introductory material essential to the respective ECE research area. Students must successfully complete a minimum of two (2) core courses from ECE 600, ECE 602, ECE 604, ECE 606, ECE 608, and ECE 610 to ensure a limited breadth of knowledge within the program. A student must select the core course for their declared ECE primary area. The primary area is to be chosen from one of the four defined areas listed in Table 2. The third column of the table indicates the core courses associated with each primary area. Note at this time IUPUI does not offer ECE 604 and ECE 606.

- Note: For students starting in Fall 2016 or after, all grades that satisfy the breadth requirement (core courses) must be C or higher.

²<http://www.abet.org>

- For students starting in Fall 2016 or after, the average of the two core courses on the student final POS must average C+ or higher

Table 2: Primary Areas within ECE and the core course associated with it.

Primary Area	Abbr.	Core Course
Automatic Control, System and Power	AC	ECE 602
Communication and Signal Processing	CS	ECE 600
Computer Engineering	CE	ECE 608
VLSI and Circuit Design	VC	ECE 606/ECE 608

Only courses offered from Indianapolis or West Lafayette campuses can be used to satisfy the breadth requirement. Regional campus courses and transfer courses must not be used toward the breadth (core course) requirement

3.3 Depth Requirement

Students must successfully complete at least fifteen (15) credit hrs in the primary area they have declared. The core course in their primary area and thesis credits (if thesis option is selected) can be applied towards this requirement. Appendix F details the list of courses in each primary area.

3.4 Math Content Course Requirement

A minimum of three (3) approved math oriented course credit hours is required for all degree programs. The approved mathematics, statistics, electrical & computer engineering, computer science, and physics courses meeting the math requirement are given in Appendix B. Note the course used to meet the Math Requirement cannot also be used to satisfy the Breadth Requirement.

3.5 Options

The ECE department offers two options for the MSECE degree

non-thesis option All 30 graduate credits will be generated from coursework.

thesis option Nine of the 30 graduate credits will be thesis credits (see Research Opportunity). The remaining 21 graduate credits will come from coursework.

3.6 Research Opportunity

Research is not required for the master's degree but is highly encouraged. There are research opportunities for both the thesis and non-thesis options.

non-thesis option Research credit hours are not required for students on non-thesis option. However, a maximum of three (3) credit hours of ECE 696 (Advanced Projects) are allowed on their plan of study for the non-thesis option. To enroll in this course, see the ECE graduate program coordinator (Sherrie Tucker at ecegrad@iupui.edu), for the form, to request permission. The course ECE 698 is not allowed on the POS of students pursuing the non-thesis option, and ECE 698 will not be converted to ECE 696.

thesis option Students pursuing the thesis option are required to register for a minimum of 9 hrs of ECE 698 Research (thesis) toward their MS degree. Students may register more than 9 hrs of ECE 698, but students are required to take a minimum of 21 hrs of regular courses.

Students should check with their major professor to determine the number of ECE 698 credit hours to take per semester. ECE 698 credit hours qualify as ECE graduate-level credit hours and may be used to satisfy the ECE depth requirement as described in Section 3.1. ECE 696 credit hours are not allowed on the POS of students pursuing the thesis option. To enroll in this course, see the ECE graduate program coordinator (Sherrie Tucker ecegrad@iupui.edu), for the form, to request permission. The course ECE 69800 is not allowed on the POS of students pursuing the non-thesis option, and ECE 698 will not be converted to ECE 696.

3.7 Minimum Academic Requirements

Good Academic Standing. The ECE Department maintains the following minimum standards to be in *good academic standing* in the Master's degree program.

To be in good academic standing, a Master's graduate student must maintain a cumulative grade point index of at least 3.00 out of 4.00 over the graduate courses they have taken as graduate student, as well maintain at least a 3.0 semester GPA on graduate courses taken each semester. A graduate student who is not in good academic standing at the end of any semester or summer session maybe given an academic warning and/or placed on probation. Decisions concerning probation/academic warning are made by the ECE Graduate Committee. A student on probation may not be permitted to register for further graduate courses, pending academic review and approval by the ECE Graduate Committee.

The cumulative grade point index used for the plan of study (POS) is calculated using the courses that are on the POS. If a course is taken more than once while the student is enrolled as a graduate student, only the most recent grade received in the course will be used in computing the grade point index. Transfer courses are not included in the computation of the cumulative grade point average. University requirements state that no grade below 'C-' is allowed for a course that is on the approved POS. All Master's students must achieve a final cumulative grade point index of 3.00 or higher for courses that are on the POS. Any course on the POS for which a grade of 'D' or 'F' is obtained must be repeated. In the event of a deficiency in the cumulative grade point index, a course may be repeated but only the most recent grade received will be used in computing the index.

Note: For students starting in Fall 2016 or after, all grades that satisfy the breadth requirement (core courses) must be C or higher.

3.8 English Requirement

All ECE graduate students must demonstrate acceptable proficiency in written English before graduating. Students will not be allowed to graduate until this requirement has been met. All teaching assistants must satisfy additional oral English proficiency.

The ECE department strongly recommends that students fulfill the English requirement as early as possible (first semester) in their academic program. The English proficiency requirements are detailed in Appendix C.

3.9 Residency and Load Requirement

3.9.1 Semester Load

All international students must be enrolled full-time to maintain appropriate visa status. To qualify as a full-time student, a student must satisfy one of the following criteria:

- be enrolled for nine (9) credit hours, or
- hold a research or graduate assistantship and be registered for at least six (6) credit hours.

3.9.2 Residency Requirements

The total number of hours of academic credit used to satisfy residency requirements consists of all course credit hours that appear on the plan of study, other graduate course credit hours on the IUPUI transcript with grades of 'B' or better, and thesis research hours that appear on the transcript. At least one-half of the total credit hours used to satisfy degree requirements must be earned in residence on the IUPUI campus, where the degree is to be granted. Course credits obtained via televised instruction on the IUPUI campus shall meet the residency requirement.

4 Master's Plan of Study (Non thesis)

The masters advisory committee shall consist of one ECE faculty member: Dr. Brian King (ECE Dept. chair).

5 Master's Advisory Committee (thesis)

The Master's Advisory Committee shall consist of a minimum of three faculty members. The duties of this committee are to assist the student in the preparation of the plan of study, advise the student on research related to the Master's thesis, and conduct examinations on the Master's thesis. The student shall select a major Professor who will serve

as the Chair of the advisory committee. The major professor/student relationship must be a mutually acceptable one. With the advice and approval of the major professor, the student will select the remaining members of the advisory committee. The Chair of ECE Graduate Program may serve as the major professor for a student with a non-thesis option or for a new coming student by default. The following rules and guidelines will help you to select your advisory committee:

1. The major professor must be a member of the ECE faculty and should be a member of the primary area that the student has declared. Refer to Appendix D for the list of faculty and their areas.
2. At least one member of the advisory committee must be from the student's primary area, and another member should be from the ECE Related Area.
3. If you have selected the thesis option and two advisors guide your research jointly, it may be advisable to have two co-chairs on your advisory committee rather than a single chair. At least one of these co-chairs must be a member of the ECE faculty and should be a member of the primary area that you have declared.
4. A majority of your advisory committee must be composed of members of the ECE faculty.
5. A special member, defined as a person without regular certification, may be added as the fourth member of the committee.
6. Faculty members from other universities, researchers from industry, and non-faculty research staff from the campus have to be approved for special certification by the Graduate School for them to be members of the advisory committee. A student may initiate a request for special certification in the ECE Graduate Office. A current and complete vita for the special member has to be submitted along with the request.

The advisory committee, as agreed upon by the student and the major professor, shall be presented to the ECE Graduate Office and the Dean of the Graduate School for approval and formal appointment. The Dean may appoint additional members if it seems advisable. The advisory committee is established when the plan of study is approved. Changes to the advisory committee require a 'Change in Plan of Study' form GS-13 to be completed.

6 Master's Plan of Study

All Master's students must file a preliminary plan of study (POS) *before the end of their first semester*. This should be done when you meet with your adviser prior to the beginning of your second semester. This requirement helps to ensure a clear academic course plan by the student, sets a clear pathway toward completion of the student's degree, and helps the school plan and monitor the overall ECE graduate program. For this reason, registration for subsequent semesters can be restricted by the ECE Graduate Committee until the plan of study has been filed. If necessary, changes can be made to the plan of study at a later date, subject to the restrictions cited in Section 6.1. The plan must be appropriate to meet the needs of the student's chosen field as determined by the advisory committee, and must be approved by the ECE Graduate Program and the Graduate School.

Electronic instructions concerning filing the official POS will be emailed to you.

6.1 Changing Your Plan of Study

It is recognized that as a student's program progresses there may arise conditions that make it desirable to change the program or the plan of study. Indeed such changes, when based on sound academic reasons, are allowed. However, there are regulations to be observed for the change. Specifically,

- A course may not be removed from an *approved* plan of study once the course has been taken and a grade of 'D+' or lower is received. This is a Graduate School rule. Refer to Appendix E for the approval process of the plan of study.
- Any change/s to a plan of study requires approval of the student's advisory committee and the ECE Graduate Program.

All graduate forms are electronic. Your IUPUI email is considered an official manner of communicating to you. The ECE graduate program coordinator will notify students via email about the procedure of completing the electronic POS. The ECE department suggests you complete the POS and submit for approval approximately one year before you expect to graduate. See ECE Graduate Coordinator for assistance, email ecegrd@iupui.edu

To make changes to an approved plan of study, Graduate School Form 13 'Request for Change to the Plan of Study' has to be completed and filed to the Graduate School. This form is also used to request a change of major professor and/or other advisory committee members, or for a change of the Master's degree option.

6.2 Undergraduate, Transfer, and Excess Course Credits

6.2.1 Transfer Credits

A maximum of twelve (12) graduate-level credit hours earned at an accredited university may be applied toward the Master's degree and entered on the Master's plan of study. All courses transferred must be graduate-level courses, must not have been used to meet the requirements for another degree, and must be completed with a grade of 'B' or better. Grades from transfer courses are not included in computing the grade point average.

6.2.2 Excess Course Credits

Up to twelve (12) credit hours of graduate-level courses taken before a student was admitted to the ECE Master's program may be applied toward the Master's degree and entered on the Master's plan of study. Allowed courses include those taken:

1. as excess undergraduate-degree credit taken at senior-year standing;
2. in non-degree status;
3. while seeking a degree in other departments or schools, if you subsequently request to transfer to ECE;
4. while seeking a degree in other departments or schools, if you subsequently request dual-degree status in ECE. For dual-degree students seeking a PhD in another department or school and a Master's degree in ECE, the ECE Master's degree plan of study may not contain any courses offered by or dual-listed with the student's other department or school.

Again the ECE graduate committee will decide if these courses are appropriate for use on our MSECE POS. A grade of B or better on the course(s) will be required for consideration.

6.2.3 Special Approval Requirements

Without exception, all transfer, and excess course credits used on the Master's plan of study must be approved by your advisory committee and by the ECE Graduate Program. The steps to follow in requesting approval to include such credits on the Master's plan of study are:

1. Add the course to your plan of study.
2. If a transfer course or a non-ECE course was taken at other universities, show a copy of the catalog description of the course to your advisory committee members and bring the catalog description to the ECE Graduate Office.
3. If you are transferring a course from another university, the ECE Graduate Program will also require an original transcript showing the grade earned and a statement from an official at the university where the course was taken certifying that the course was not used to fulfill requirements for any other degree.

6.3 Credits taken outside the ECE Department

One 3 credit Mathematics content course must be chosen from the list in Appendix B for the plan of study in order to satisfy the Mathematics requirement (see Section 3.4). Only 3 additional credits, taken from another department can be counted on the plan of study. These credits can be selected from the list in Appendix B, or the credit selection (i.e. course) must be approved by both your advisory committee and by the ECE Graduate Program, this approval *must be obtained prior* to taking the course. Whenever one takes a course outside the ECE department, with the exception of a Mathematics course that is used to satisfy the math content requirement, one needs to complete the **ECE Graduate Course Outside Department Approval Form**, forms are available in the ECE Graduate office in SL 160, see the ECE Graduate Program Coordinator (Sherrie Tucker) (ecegrad@iupui.edu).

7 Registration

The registration period begins during the third week of October for the Spring semester and during the third week of March for the Summer sessions and Fall semester. Keep a look out for announcements on registration as these dates approach. All current ECE graduate students must register during this registration period (October-November and March-April). Note that late registration incurs a penalty fee. We encourage you to select your courses and register early, as department's decisions to cancel courses that have low enrollment may affect your course options.

Dropping and Adding Courses. Be aware of procedures, late fee charges, and refunds deadlines for dropping and adding of courses. Students may drop/add courses on-line during the open registration period. However, once the Open Registration period ends, on-line registration will not be available and students must use a Drop/Add paper form to change a course. Information on procedures and deadlines are available on the Registrar's website ³.

Inactive Academic Status. Students who do not enroll in classes or skip (1) semester, must submit a request to the ECE Graduate coordinator to be term activated. Students who do not enroll in classes for three (3) consecutive academic sessions, this includes summer session, will be automatically placed into inactive academic status. Students who have been placed in inactive academic status are required to apply for and be granted re-admission to the graduate program before they are permitted to enroll again. The application process for readmission consists of completing and submitting a new application other supporting application materials are not required for re-admission. Students who skip (1) semester, will need to request to be "term activated" contact the ECE graduate coordinator. Include your full name and student ID in your request. Students must wait for their applications for re-admission to be officially approved by the Purdue University Graduate School before enrolling for classes. Registration activities that take place while in the inactive academic status and before a new application for re-admission has been officially approved by the Graduate School are considered invalid registrations and will not count toward graduate credit.

8 Master's Thesis and Final Examination

For those pursuing the thesis option, a thesis must be prepared according to a preset format using L^AT_EX⁴ and processed (revised, signatures obtained, bound, distributed) following specified procedures. Likewise, the student must present and defend his/her work in a Final Examination. Information relative to the preparation and processing of the thesis is contained in Appendix D. Appendix E outlines the steps involved in scheduling the final examination.

9 Petitions to the Graduate Committee

All graduate students have the right to petition for exceptions to any existing rules if they feel that the circumstances are sufficiently unusual to warrant special consideration. The petition should be delivered in writing to the Chair of the ECE Graduate Committee and should contain the approval (or disapproval) of each member of the student's advisory committee.

³<http://registrar.iupui.edu>

⁴Guidance in using L^AT_EX will be provided and tools such as Overleaf make it easy to write your document using L^AT_EX

A Undergraduate Course Requirement

This appendix describes undergraduate course requirements for the MSECE degree program to qualify a BS major other than CmpE, ECE, and EE.

A.1 Courses Required

Graduates from non-ABET accredited programs or graduates of non-engineering majors, including technology and science programs, may complete and be awarded the Master of Science in Electrical and Computer Engineering degree (MSECE) if the following undergraduate course requirements are fulfilled, in addition to completing the Master's degree requirements:

- ECE 201, ECE 264, ECE 301, ECE 302,
- One of ECE 305 and ECE 311, ECE 408
- Two of ECE 255, ECE 270, ECE 321, and ECE 382,
- One of ECE 362, ECE 359, and ECE 365; and
- One undergraduate lab of ECE 207, ECE 208, and ECE 282.

Graduates from Computer Science discipline may be asked to take either ECE 301 or ECE 302. The engineering courses listed above require the following math and/or science prerequisites or equivalents:

MATH 165	Analytic Geometry and Calculus I
MATH 166	Analytic Geometry and Calculus II
MATH 171	Multidimensional Mathematics
MATH 261	Multivariate Calculus
MATH 266	Differential Equations
PHYS 251	Heat, Electricity, and Optics

A.2 Ways to Fulfill the Requirements

The “Undergraduate Requirements” are administered by the ECE department and the Graduate Programs Office. A student may fulfill the requirements for an undergraduate electrical and computer engineering course through the following ways:

1. Taking the indicated course and receiving a grade of ‘B’ or better.
2. For a course offering a comprehensive final exam, taking the final exam for the course and ranking in the top 30% of the class taking the exam. (This is available only to students who are not enrolled in the course.)
3. Establishing that s/he had obtained a grade of ‘B’ or better in an equivalent course.
4. Taking a closely related Electrical and Computer Engineering graduate course such as ECE 201/ECE 554, ECE 270/ECE 559, ECE 301/ECE 538, ECE 302/ECE 600, ECE 305/ECE 606, ECE 311/ECE 604, ECE 359/ECE 608, ECE 365/ECE 565, ECE 408/ECE 595-RTOS, ECE 382/ECE 602, and ECE Lab/ECE 557, receiving a grade of ‘B’ or better.

Note that the purpose of the undergraduate requirements is to give substance to the claim that the person receiving the MSECE does indeed have an electrical and computer engineering background. The requirements are not related to the prerequisites for graduate courses.

B Mathematics Requirement

The following list of courses have been approved for meeting the mathematics requirement.

B.1 Mathematics Courses

Courses numbered MATH 511 and above are acceptable with the exceptions listed below:

1. MATH 519 (STAT 519) is *not* acceptable due to significant overlap with ECE 600
2. MATH 504 is acceptable for students whose primary area is either Automatic Controls or Communications and Signal Processing;
3. MATH 527 is *not* acceptable for Communications and Signal Processing majors.
4. Math education related courses are not acceptable.

B.2 Electrical & Computer Engineering Courses

ECE 580 Optimization Methods for Systems & Control

ECE 595 Foundations of Advanced Engineering I

ECE 600 Random Variables *Note: To use ECE 600 as Math content you must have three core classes on POS*

ECE 695 Error Correction Codes (Error Control Coding)

B.3 Computer Science Courses

CSCI 514 Numerical Analysis

CSCI 515 Numerical Analysis of Linear Systems

CSCI 520 Computational Methods in Analysis

CSCI 614 Numerical Solution of Ordinary Differential Equations

CSCI 615 Numerical Solution of Partial Differential Equations

B.4 Statistics Courses

STAT 528 Introduction to Mathematical Statistics

STAT 529 Applied Decision Theory and Bayesian Statistics

STAT 532 (MATH 532) Elements of Stochastic Processes

STAT 533 Non-Parametric Statistics

STAT 538 (MATH 538) Probability Theory I

STAT 539 (MATH 539) Probability Theory II

STAT 553 Theory of Linear Models and Experimental Designs

STAT 554 Multivariate Test Statistics

STAT 555 Non-Parametric Statistics

STAT 576 Introduction to Statistical Decision Theory

STAT 638 (MATH 638) Stochastic Processes I

STAT 639 (MATH 639) Stochastic Processes II

STAT 657 Theory of Tests, Estimation and Decisions I

STAT 658 Theory of Tests, Estimation and Decisions II

STAT 667 Measure-Theoretic Statistics: Decision Theoretic and Classical

STAT 668 Asymptotic Distribution Theory

B.5 Physics Courses

PHYS 600 Methods of Theoretical Physics I

PHYS 601 Methods of Theoretical Physics II

Please Note: Faculty-initiated requests for changes or exceptions to the above will be considered by the Graduate Committee after approval by the appropriate area. Student-initiated requests must follow the same procedure, with the additional first step of approval by the student's major adviser.

C English Language Proficiency Requirements

C.1 English as a Second Language (ESL) Requirements

All graduate degree-seeking international students whose English is not their first language must take the English Placement Test (English language proficiency examination) administered by the IUPUI English as a Second Language (ESL) Program before they are permitted to enroll for classes after admission.

Students tested with English language deficiencies are required to take all of the remedial courses determined by the ESL placements and receive passing grades on those courses. Students must begin taking the first ESL course in the first semester of enrollment and complete the requirements in sequence before graduation. Students with incomplete ESL requirements will not be approved for graduation. There is one exception to the rule: “Students placed into English G013 ‘Reading/Writing for Academic Purposes’ may replace G013 with TCM 460 ‘Engineering Communication in Academic Context’.”

C.2 SPEAK Test for International Graduate Teaching Assistants

All non-native speakers of English must be tested for their oral English proficiency before they are assigned duties that involve direct student contact (teaching assistant, laboratory assistant, graders, and tutors). Students must take and pass the SPEAK Test, a nationally standardized test before the students are given an academic appointment. Students who failed to obtain the required minimum scores will need to take an ESL course, G020 “Communication Skills for International Teaching Assistants” (3 credit hours) and take the test again before they can accept their appointments.

D ECE Graduate Faculty

Note the following abbreviation for primary areas: Automatic Control, Robotics and System (AC); Communication and Signal Processing (CS); Computer Engineering (CE); and VLSI and Circuit Design (VC). The chair of your POS committee must be one of the ECE faculty given below.

Regular Graduate Appointment

Name	Identifiers	Area
Zina Ben Miled	X0360	CE
Yaobin Chen	X0225	AC
Yung Ping Stanley Chien	X0224	CE
Lauren Christopher	X0565	CS, VC
Euzelli dos Santos	X0704	AC
Mohamed El-Sharkawy	X0260	CS, CE
Dongsoo (Stephen) Kim	X0390	CS, CE
Brian King	X0412	CS, CE
Sarah Koskie	X0430	AC
John Lee	X0480	CE, VC
Lingxi Li	X0564	AC
Steven Rovnyak	X0425	AC
Maher E. Rizkalla	X0191	VC
David Russomanno	X0640	CE
Peter Schubert	X0684	AC, VC
Paul Salama	X0369	CS, CE

For other faculty graduate identifiers, see http://www.engr.iupui.edu/gradprogs/facstaff_identifiers.shtml?facstaff

E Master’s Degree Milestones

The following are “milestones” that should be used as a guide to accomplish needed tasks to complete the degree requirement:

- Prior to First Semester Registration:

- Schedule an advising appointment with your initial graduate adviser regarding possible courses to take.
- If necessary, contact ECE Graduate Program (SL 160), ECE Graduate Committee chair, and/or chair of the department for assistance with registration.
- During the First Semester:
 - Satisfy conditions for admission and/or English proficiency requirements, if relevant.
 - Decide if you will opt for thesis option or non-thesis option.
 - Select major professor (adviser) and advisory committee
 - Prepare the preliminary Masters plan of study and submit the plan prior to registration for the second semester.
 - In the fourth month of your first semester please schedule an advising appointment to take place prior to your second semester.
- One Semester Prior to the Final Semester of Graduation:
 - Fill out an electronic “Application for Graduation” form before the beginning of the final semester. Please note all deadlines.
 - Review your plan of study to see that all degree requirements are met. Revise the plan of study if necessary.
- The Final Semester (Thesis Option):
 - Thesis option students must attend a briefing session on thesis formatting (ECE requires students to use \LaTeX) and preparations for thesis defense. The Department provides students access to Overleaf, which is a tool that makes the processing of \LaTeX straightforward. Check with the Coordinator for Graduate Programs on dates for the briefing session. The briefing session takes about 2.5 hours.
 - Obtain major professor’s approval of the thesis prior to scheduling the final examination (defense).
 - Submit Graduate School Form 8 “Request for Appointment of Examining Committee” through *mypurdue* a minimum of 3 weeks prior to the proposed date of final oral examination/thesis defense. Also, schedule the final examination (thesis defense) with major professor and advisory members at least 3 weeks in advance. You are required to meet the deadlines by which the final thesis examination must be completed. Register for “Candidacy 991” (0 credit hour) in the final semester of graduation.
 - Distribute electronic copies of thesis to members of the Advisory Committee and the ECE Graduate Coordinator (Sherrie Tucker) at least 2 weeks before the oral exam to allow sufficient time for members to review the thesis.
 - Day of defense: Forms required Form 30 (this will be the first page of your thesis), Form 32 and Form 9. Forms 30 and 32 are electronic available through *mypurdue*. Form 9 is available www.purdue.edu/gradschool/faculty/forms.html
 - After the exam and all necessary changes have been made to your thesis. Requirements concerning submission of thesis will be outlined in the briefing session for thesis preparation.
 - See Appendix G for more detailed information on submitting your request for final exam, and Appendix D for ECE graduate faculty identifiers.
- Final Semester (Non-Thesis Option):
 - Register for “Candidacy 991” (0 credit hour) in your final semester of graduation. Candidacy is required in the final semester of graduation.

F Graduate Courses for the Primary Area

The list below was revised on August 2018. An up-to-date graduate course list is available on the ECE Graduate website. Note the following abbreviation for primary areas: Automatic Control, Robotics and System (AC); Communication and Signal Processing (CS); Computer Engineering (CE); and VLSI and Circuit Design (VC).

Course Number/Title	AC	CS	CE	VC	Semester Offered ⁵
ECE 510 Introduction to Biometrics		V	V		Infrequent
ECE 52301 Nanosystem Principles				V	Fall
ECE 52601 Integrated Nanosystem Processes & Device				V	Unavailable
ECE 52702 Adv. Power Converters	V				Spring
ECE 532 Computational Methods for Power System Analysis	V				Spring
ECE 53301 Wireless and Multimedia Computing		V	V		Fall
ECE 537 Multimedia Applications		V	V		Infrequent
ECE 538 Digital Signal Processing I		V	V		Fall 2018
ECE 53801 Intro. to Discrete Event Dynamic Sys.	V				Fall
ECE 53900 Foundations of Adv. Eng. I		V	V		Fall 2018
ECE 544 Introduction to Digital Communications		V			Unavailable
ECE 547 Introduction to Computer Communication Networks		V	V		Fall
ECE 54800 Intro. to 2D & 3D Image Proc.		V			Unavailable
ECE 554 Electronic Instrumentation and Control Circuits				V	Spring
ECE 55801 System on a chip				V	Spring even year
ECE 559 MOS VLSI Design				V	Fall odd year
ECE 56401 Computer Security			V		Spring 2019
ECE 565 Computer Architecture			V		Spring
ECE 56601 Real-Time Operating Systems and Applications			V		Fall 2018
ECE 569 Introduction to Robotics	V				Fall
ECE 570 Artificial Intelligence			V		Fall
ECE 57101 Modeling/Smart Devices		V	V		Fall 2017
ECE 580 Optimization Methods for Systems and Control	V				Spring
ECE 595 Automotive Control	V				Unavailable
ECE 595 Design with Embedded and Digital Signal Processors		V	V		Spring
ECE 595 Architecture and Computing Trends in Parallel and Distributed Systems			V		Spring even years
ECE 595 Machine learning & statistical signal proc.		V			Spring even year
ECE 595 Smart Grid	V				Summer 2018
ECE 595 Medical Image Analysis		V			unavailable
ECE 600 Random Variables and Signals		V			Fall
ECE 602 Lumped System Theory	V				Spring
ECE 604 Electro Magnetic Field Theory				V	not offered
ECE 606 Solid-State Devices				V	not offered
ECE 608 Computational Models and Methods			V	V	Spring
ECE 610 Energy Conversion	V				Fall
ECE 627 Cryptography & Intro. to Secure Comm.		V	V		Fall odd yrs.
ECE 637 Digital Image Processing I		V			Spring 2019
ECE 648 Wavelet, Time-Frequency, and Multirate Signal Processing		V			Unavailable
ECE 662 Pattern Recognition and Decision-Making Processes	V	V			Fall 2019
ECE 680 Modern Automatic Control	V				Fall
ECE 684 Linear Multivariable Control	V				Unavailable
ECE 685 Introduction to Robust Control	V				Infrequent
ECE 695 Mobile Wireless Networks		V	V		Spring 2019
ECE 695 Error Control Coding		V	V		Unavailable

Unavailable= courses are offered, but at the time this document was constructed, the tentative offering schedule could not be determined. Consult with your adviser and/or the Schedule of Classes.

Infrequent= courses are offered irregularly

Note: The above table represents a tentative frequency of courses offered. Students should rely on the current schedule of classes for courses offered in a given semester and should communicate with their advisers about potential changes in future years.

G Final Oral Examination (Thesis Defense)

This appendix describes the procedure for scheduling and completing the final oral examination (defense). *The final exam must be scheduled and announced at least three weeks before the examination date by filing the Graduate School Form 8.* Consult the following procedure for preparing the thesis and final oral examination:

1. ECE Department requires all students to use Latex to format their thesis.
2. Before proceeding to write your thesis, you are strongly advised to consult with your major professor to review your plans for preparing and presenting the thesis. Check with your professor if your research thesis needs to be kept confidential. If confidentiality is required for your thesis, a request for confidentiality needs to be submitted to the Purdue Graduate School by completing Graduate School Form 15 "Request for Confidentiality of Thesis." Form 15 can be obtained <http://www.purdue.edu/gradschool/faculty/forms.html> The form must be typed and submitted to ECE Graduate Program Coordinator.
3. At least two to three weeks prior to the oral examination, provide an electronic draft of your thesis to each member of the examining committee (advisory committee) for review.
4. Necessary forms and final oral exam must be completed by their deadlines. Be sure to have a copy of the "Graduation Deadlines" for the semester you intend to graduate. A copy of the Graduation Deadlines can be obtained from the ECE Graduate Office, you will also receive emails of graduate deadlines.
5. On the day of the final exam, you must have the following two forms prepared, typed and ready to be signed by your advisory committee members:
 - Graduate School Form 32 "Thesis Dissertation Agreement", and
 - Graduate School Form 9 "Thesis Acceptance."(which are available at <http://www.purdue.edu/gradschool/faculty/forms.html>). Immediately after your oral exam, Form 32 must be signed and returned by your major professor to the ECE Graduate Program Coordinator. Form 9 needs to be submitted to the ECE Graduate Program Coordinator when all revisions to the thesis have been completed.
6. The final copy of your thesis to be deposited needs to comply with the format requirements of the Purdue Graduate School. The thesis must be checked for proper formatting and approved by the Graduate Programs Coordinator before it is deposited. Allow sufficient time to make any changes necessary to ensure that the thesis is in compliance with format requirements. Once all formatting has been finalized and approved you will receive instructions on how to deposit.
7. Obtain all necessary signatures on the Thesis Acceptance form and include the original form on the front of the thesis to be bound.
8. Bound theses needs to be submitted to the department and thesis adviser.