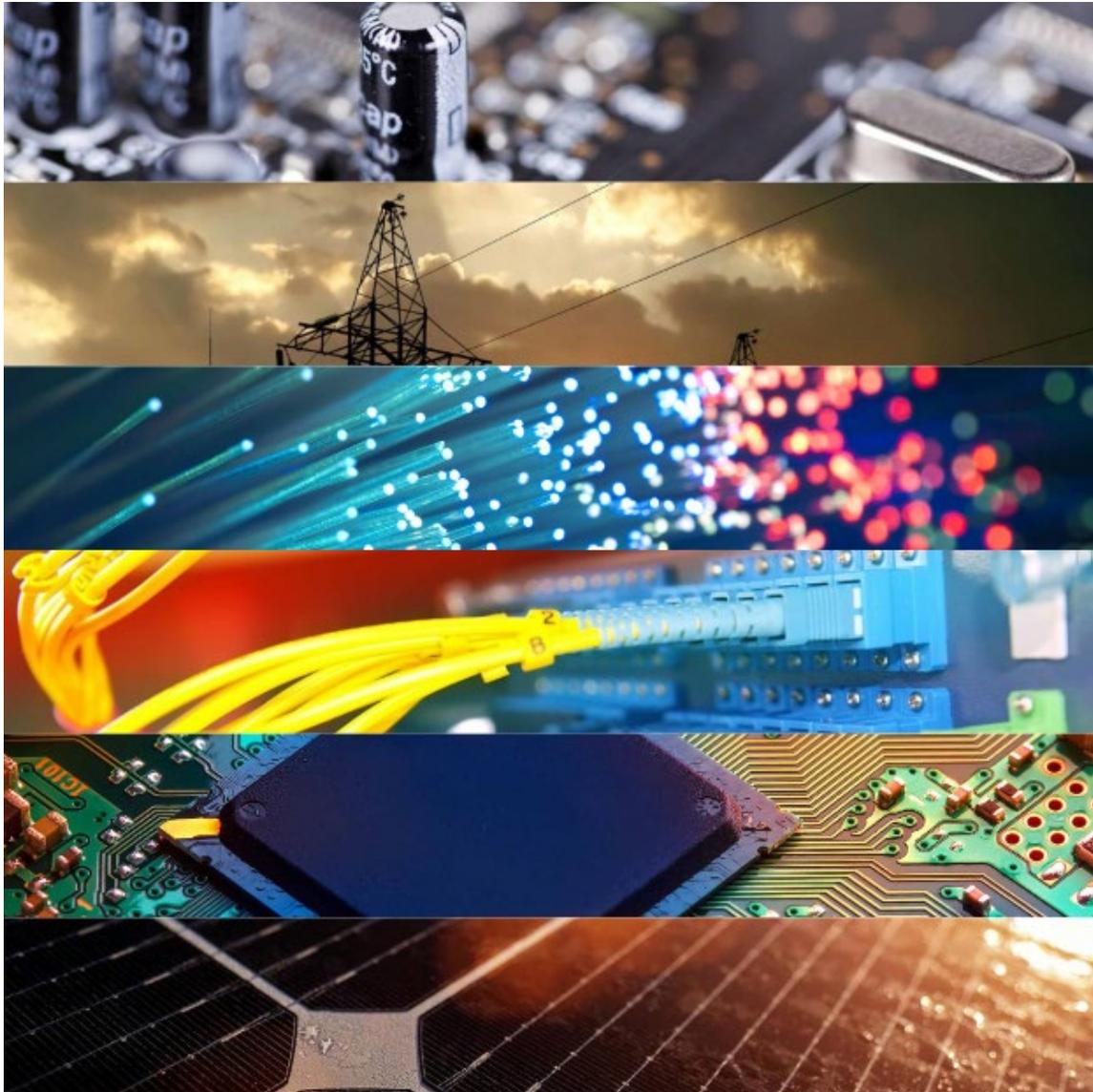


# ECEE GRADUATE PROGRAM HANDBOOK

Formerly the Blue Graduate Student Guide



*Handbook for Electrical Engineering MSE, Electrical Engineering MS, Electrical Engineering (Art, Media and Engineering) MS, Electrical Engineering PhD, Electrical Engineering (Art, Media and Engineering) PhD, Nuclear Power Generation Certificate, and Sensor, Signal and Information Processing Certificate*

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# INTRODUCTION

## DEPARTMENT OVERVIEW

The School of Electrical, Computer and Energy Engineering (ECEE) offers highly ranked programs with faculty who make significant contributions in their field. Our dedicated faculty, staff, and students drive the school's success and improve the quality of our programs. ECEE graduates go on to prestigious careers at world-renowned companies and academic institutions (including ASU).

In 1959, ASU established the Electrical Engineering MSE degree and by 1961, the PhD program was created. In the early 1990s, the student handbook was introduced as the "Blue Guide" gaining its name from the blue-colored paper it was printed on. Over the next few years, the "Blue Guide" moved online but retained the title. In the 2020-2021 academic year, the handbook was refreshed and renamed the ECEE Graduate Program Handbook (Formerly the Blue Graduate Student Guide).

## DIVERSITY, INCLUSION, AND INDIGENOUS LAND ACKNOWLEDGEMENT

Arizona State University, The Ira A. Fulton Schools of Engineering (IAFSE), and all the schools within IAFSE upholds, values, and cherishes student and faculty diversity, no matter the circumstance. As members of the ASU community, we are charged with challenging injustices and social inequities of any kind through education. These values are an integral part of our standing as an institution and must be upheld by all members of the ASU community, including but not limited to all IAFSE staff, faculty, and students. ASU is a comprehensive public research university, measured not by whom it excludes, but by whom it includes and how they succeed; advancing research and discovery of public value; and assuming fundamental responsibility for the economic, social, cultural, and overall health of the communities it serves.

ECEE acknowledges the twenty-two Native Nations that have inhabited this land for centuries. Arizona State University's four campuses are located in the Salt River Valley on ancestral territories of Indigenous peoples, including the Akimel O'odham (Pima) and Pee Posh (Maricopa) Indian Communities, whose care and keeping of these lands allows us to be here today. ECEE acknowledges the sovereignty of these nations and seeks to foster an environment of success and possibility for Native American students and patrons. We are advocates for the incorporation of Indigenous knowledge systems and research methodologies within electrical engineering. ECEE welcomes members of the Akimel O'odham and Pee Posh, and all Native nations to our programs.

## TITLE IX

ASU prohibits all forms of discrimination, harassment and retaliation. To view ASU's policy please see <https://www.asu.edu/aad/manuals/acd/acd401.html>.

Title IX protects individuals from discrimination based on sex in any educational program or activity operated by recipients of federal financial assistance. As required by Title IX, ASU does not discriminate on the basis of sex in the education programs or activities that we operate, including in admission and employment. Inquiries concerning the application of Title IX may be referred to the Title IX Coordinator or to the U.S. Department of Education, Assistant Secretary, or both. Contact [titleixcoordinator@asu.edu](mailto:titleixcoordinator@asu.edu) or 480-965-0696 for more information. Office located at 1120 S. Cady Mall, INTDSB 284. For information on making a report please go to [www.asu.edu/reportit/](http://www.asu.edu/reportit/).

## **ADMINISTRATION**

The electrical engineering Graduate Committee advises the School Director on all policy matters concerning the graduate program. The faculty reviews and grades the final portfolio for the MSE degree and rules on student petitions.

The ECEE Graduate Program Chair administers the electrical engineering graduate program for the School Director in accordance with policies of Graduate College and the School faculty. In addition, the Chair serves as the focal point for graduate students and graduate programs within the School.

General information, including admission, residency, and degree requirements of Graduate College, is contained in the latest ASU [Graduate Catalog](#). Graduate College's general requirements apply in their entirety to the graduate programs in electrical engineering. This document contains additional and more specific requirements of the electrical engineering program.

## **STUDENT RESPONSIBILITY**

It is the responsibility of each student to understand and observe all procedures and requirements specified by Graduate College and the electrical engineering program. The faculty mentor and academic advisors provides academic advice and assistance; however, the ultimate responsibility for meeting degree requirements remains with the student.

Students are also highly encouraged to advocate for themselves and seek assistance when needed. Graduate College and the Graduate and Professional Student Association (GPSA) have created guides with important information about resources for students: [10 Best Practices in Graduate Student Wellbeing](#) and [Graduate Wellness Resources](#).

## **GRADUATE DEGREE PROGRAMS**

The electrical engineering program offers courses leading to the degrees of Master of Science in Engineering (MSE), Master of Science (MS), and Doctor of Philosophy (PhD). The primary difference between the MS and MSE programs is that the MS is a research degree culminating in a thesis and the MSE is a professional degree with a culminating experience of a portfolio. General requirements for these degrees are stated in the current Graduate Catalog and specific school requirements are contained in later sections of this guide.

## **RESEARCH**

Research opportunities in the school are available in a broad spectrum of subjects encompassing traditional as well as new specialties. Much of the research is actively supported by national foundations, government agencies, and local industry. The faculty is engaged in significant research in the following areas:

- Control Systems
- Electromagnetics, Antennas and Microwave Circuits
- Electronic and Mixed-Signal Circuit Design
- Electric Power and Energy Systems
- Signal Processing and Communications
- Physical Electronics and Photonics

## **COURSES AND COURSE PREREQUISITES**

Many of our graduate-level electrical engineering classes have prerequisites. These graduate classes cannot be completed satisfactorily without the listed prerequisites. Prerequisites can be

found through the [course search tool](#) and then clicking on the applicable course. There will be a section for prerequisite classes that are needed to be successful in the course you are interested in. You can also view the recommended prerequisites for our ECEE graduate classes found on the [Prerequisites and Course Topics](#) page or reference the course syllabus.

Because most of the electrical engineering graduate students graduated with undergraduate degrees from institutions other than ASU, these students would not have had the prerequisite class at ASU. It is only necessary that they have had the equivalent material in a previous class.

### **Classes that require permission to register**

There are several classes that require permission to register. Students should speak to their assigned academic advisor to obtain permission to register for the following courses-

- Research (EEE 592 and EEE 792)
- Thesis (EEE 599)
- Dissertation (EEE 799)
- Continuing Registration (EEE 595 and EEE 795)
- Internship for international students (EEE 684)
- Practicum (EEE 680)
- Reading and Conference (EEE 590 and 790)
  - o The content of any proposed Reading and Conference course must be reviewed and approved by the Graduate Program Chair before registering for the course.

### **Taking courses outside of electrical engineering**

Some graduate courses offered outside the School do not have enough technical content to count toward the electrical engineering degree. Courses outside of Electrical Engineering might count as 400 level with special approval from the Graduate Program Chair. Please consult with your assigned academic advisor for additional information.

## **MASTER'S DEGREES**

### **ADMISSIONS**

The decision to admit a student to a master's program in electrical engineering who has earned a bachelor's degree in Electrical Engineering is based upon several factors. Please refer to the information below for the minimum required GPA and test scores.

#### **Domestic applicants**

Applicants are required to have a least a 3.0/4.0 junior-senior GPA.

A student whose undergraduate degree is from a US ABET-accredited institution is not required to submit GRE scores. After submitting the application, the applicant should email the advising office to have that task item waived. If the applicant has not completed a degree from a US ABET-accredited institution, a minimum score of at least 156 on the quantitative portion of the GRE is required.

#### **International applicants**

Applicants are required to have a least a 3.5/4.0 junior-senior GPA.

A student whose undergraduate degree is not from a US ABET-accredited institution must score at least 156 on the quantitative portion of the GRE.

In addition, an applicant whose native language is not English must demonstrate proficiency in the English language by scoring at least 90 on the Test of English as a Foreign Language (TOEFL), or

an overall band score of 6.5 on the International English Language Testing System (IELTS) exam, or an overall score of at least 60 on the Pearson Test of English (PTE). International students seeking teaching assistantships must demonstrate proficiency in spoken English by scoring at least 24 on the speaking portion of the iBT or 50 on the ASU administered SPEAK Test.

### **Deadlines**

For the fall semester, preference is given to complete ECEE graduate applications received by **December 31**. Admission results should be available by March 1. Applications received after this preferred deadline will be considered.

For the spring semester, preference is given to complete ECEE graduate applications received by **July 31**. Admission results should be available by October 1. Applications received after this preferred deadline will be considered.

### **Non-degree applicants**

Non-degree students will not be allowed to register for electrical engineering courses without special permission. To enroll in graduate-level courses as a non-degree student, the applicant must meet the requirements for regular admission to the graduate program. Usually, only one graduate-level class will be allowed for a non-degree student through the online campus.

### **Campus options**

These are the programs that are offered on the Tempe and online campuses-

TEMPE: EE MSE, EE MS, EE (AME) MS

ONLINE: EE MSE and EE MSE/MBA

### **EE MSE VS. EE MS**

All students interested in earning a master's degree in electrical engineering must apply to the EE MSE program, which is not research based. If a student is interested in pursuing a thesis in the future and is interested in the EE MS program, they must first start in the EE MSE program. After their first semester, they may be permitted to change from the EE MSE program to the EE MS program if their GPA is at least 3.0 and they have a faculty member who agrees to oversee their thesis research. Students registered for the MS who do not complete a thesis and wish to switch back to the MSE may be awarded failing grades for up to six hours of thesis and research is at the discretion of the Committee Chair and/or ECEE Program Chair.

### **COURSE REQUIREMENTS FOR THE MSE AND MS PROGRAMS**

The School offers graduate-level courses in several subject areas, however, a student pursuing a master's degree is recommended to take six credits of course work outside the area of specialization as part of the plan of study. Courses from each area will be determined by the student and the student's faculty mentor. Suggested courses for inclusion in the MS and MSE programs in each area of specialization can be found on the [ECEE School web site](#).

### **EE MSE DEGREE REQUIREMENTS**

The MSE is a professional degree **requiring a minimum of 10 courses** of at least 3 or 4 credits each (30 hours minimum) and a final portfolio.

Requirements include:

- A minimum of five EEE courses
- **A maximum of four courses (combined) from the following groups: two 400-level courses outside of ECEE, EEE 591, EEE 590 (Reading and Conference), or FSE 500-level.**
- A minimum of three EEE 500-level courses (not including EEE 591, EEE 590, and FSE 500)
- It is recommended to take two courses outside of your area of specialization, but not required.

### **Portfolio**

As of the spring 2023 semester, the EE MSE program no longer requires a written comprehensive exam as the culminating event. Students are now required to complete a portfolio based on seminar attendance. Students are required to attend seminars hosted by the department in the last semester of their program, answer questions on the seminars, and show proof of attendance. Through answering questions about the seminar, students will demonstrate a knowledge and understanding of the topics presented, how it relates to what they have learned in the program, and how they might use this knowledge in the future.

Students will be emailed each semester about seminars and the requirements. Additionally, information will be on the ECEE website along with the questions that students must answer and the submission deadline. Students are encouraged to speak with their assigned academic advisor if they have questions about this degree requirement.

## **EE MS DEGREE REQUIREMENTS**

The MS is a research degree requiring a minimum of 30 credits that is only offered in person on the Tempe campus. These credits must include a minimum of eight courses of at least 3 or 4 credits each (24 hours minimum) and six hours of EEE 599 (Thesis). Requirements include:

- A minimum of four EEE courses
- **A maximum of four courses (combined) from the following groups: two 400-level courses outside of ECEE, EEE 591, EEE 590 (Reading and Conference), or FSE 500-level.**
- A minimum of three EEE 500-level courses (not including EEE 591, EEE 590, and FSE 500)
- It is recommended to take two courses outside of your area of specialization, but not required.
- Six credits of EEE 599 (Thesis)

A final oral exam in defense of the thesis completes the MS degree requirements.

### **Advisory Committee**

MS students will need to consult with ECEE faculty to inquire whether they will oversee their research. Once a faculty member agrees, they will be the student's committee chair. The Committee Chair of the advisory committee must be a member of the electrical engineering program graduate faculty with endorse-to-chair approval. The MS thesis advisor will help the student select the other two members of the advisory committee. The advisory committee should be formed and approved by the Graduate Program Chair as early as possible, but certainly no later than the semester before graduation.

## **Research and Thesis**

Because the MS is a research degree, it requires a thesis. A student presenting a thesis must register for six credits of thesis (EEE 599). Opportunities for participation in research are abundant in electrical engineering, so a student in a program that requires a thesis is expected to select a thesis advisor and become an active participant in a research program in the first year of study. A thesis usually requires a continuing effort over two or three semesters.

Thesis credit (EEE 599) can be graded with options of C, D, E, Y or Z. A grade of Z indicates a course in progress and is at the discretion of the thesis advisor. Such a grade may later be changed to a Y grade (passing) or left on the permanent record.

An oral examination in defense of the thesis will be conducted by the students advisory committee. The oral defense must be scheduled through Graduate College 10 business days in advance. The thesis must be submitted to Graduate College for format review at least 10 calendar days before the oral defense. No exceptions to this rule will be made. In addition, the thesis must be delivered to all committee members at least 10 calendar days before the oral defense.

When the student completes the thesis, the academic advisor assigns a grade of Y to the thesis credits, which indicates successful completion of the thesis and passing the oral defense. If a student does not complete the thesis, the thesis mentor may assign a failing grade of E to the thesis credits.

## **TAKING MORE THAN 11 CREDITS IN A SEMESTER**

Master's students are limited to 11 credits each fall and spring semester. Students with a 3.5 minimum GPA may request an exception to this policy by meeting with a Graduate Academic Advisor after completing their first semester.

## **DUAL MBA/MSE EE DEGREE**

The MBA/MSE EE degree program requires 57 credit hours of study including courses from the W.P. Carey School of Business and the Ira A. Fulton Schools of Engineering. Students receive two degrees, the Master of Business Administration (MBA) and Master of Science in Engineering in Electrical Engineering (MSE EE), upon completion of all requirements. The program is designed to be completed in three years, but could take longer based on degree progress, GPA, and successful completion of the EE MSE Portfolio.

The requirements are:

MBA Degree: 35 credit hours of business courses (11 courses)

MSE Degree: 22 credit hours of engineering courses (8 courses)

The MBA/MSE EE degree program is designed as:

- An online program- offering the working professional added flexibility on all courses.
- A cohort program- students enter and take courses as a group for continued collaborative learning.
- A consolidated program- completion of the entire program within three years if attending full time

Additional information is available on the [ECEE](#) and [W.P. Carey](#) websites.

The EE MSE portion of this program follows the EE MSE degree requirements. The only difference is that two of the classes on the student's iPOS will be business classes. Please refer to the EE MSE degree requirements for information on course and portfolio requirements.

## **ACCELERATED BACHELOR/MASTER'S DEGREE PROGRAM**

ECEE offers an accelerated program for students currently enrolled in the bachelor's degree in electrical engineering. This allows students to graduate with both degrees in five years of full-time course work.

Students interested in this program must meet the following eligibility requirements:

- Have at least 75 credits applicable to an ASU EE BSE degree.
- Have a cumulative ASU GPA or major GPA (found in the DARS) of 3.25 or higher.
- Have a minimum of 90 credit hours of coursework applicable to the ASU EE BSE degree completed prior to enrollment in the accelerated program.

Students will be able to earn a BSE and MSE/MS degree by sharing up to three graduate-level classes taken as technical electives for each program. Those credits will apply toward both the undergraduate and graduate degrees and cannot exceed 12 credits. You can also reserve graduate coursework taken as an undergraduate student. Any combination of shared and reserved coursework cannot exceed 12 credits. While pursuing the MSE/MS, the student must be registered as a full-time student (9 or more hours) unless enrolled for the final semester.

Students must first apply to the MSE program and could change to the MS (thesis) program if they have a faculty member who is willing to oversee their thesis work. Students should plan to apply to the MSE program first, and then could change to MS in the future if they are interested in doing a thesis.

## **ELECTRICAL ENGINEERING (ART, MEDIA AND ENGINEERING) MS**

The concentration in arts, media and engineering has been established as collaboration between the electrical engineering program at ASU and the Herberger Institute for Design and the Arts. The AME program represents an ambitious interdisciplinary research community at ASU that is focused on the parallel development of media hardware, software, content and theory. AME research addresses the discontinuity that exists between media content and media technologies through a paradigm shift in media and arts training. The objective is to produce a new kind of hybrid graduate student who draws creativity from the arts and methodology from engineering sciences. AME trains students to integrate principles of digital signal processing and multimedia computing with artistic ideas and objectives, with the goal of enabling new paradigms of human-machine experience that directly address societal needs and facilitate knowledge. More information can be found on the [ECEE](#) website

The EE (AME) MS program requires that students complete eight courses and six thesis credits. The eight courses generally follow the EE MS degree requirements, with the exception that roughly 1/3<sup>rd</sup> of the coursework (2 or 3 courses) be from the AME department. Of the six thesis credits, four of the credits must be EEE 599 and 2 of the credits must be AME 599.

## PHD DEGREES

The doctoral programs in Electrical Engineering are organized by whether the prospective student has a master's degree. If a student does not hold a master's degree, but desires to pursue not only a master's, but a PhD as well, you would apply as a Direct PhD candidate. Students who hold a master's degree and are desiring to pursue their PhD, you will apply as a regular PhD candidate. There is only one application to the PhD program and students are required to list their educational history on the application. The differences in the degree requirements are listed below. The PhD program has been designed to test a prospective student's ability in the areas of research, writing and oral presentation. While working on the PhD application packet, you will need to contact one of our faculty to see if they will oversee your research and candidacy towards the PhD program. Each prospective student needs to pass the Qualifying Exam (see further information below) to see if they meet the rigors of PhD program. Throughout the program, our students attend college classes, complete research and dissertation course work. Towards the end of the program, students will then be tested by means of a comprehensive exam and the dissertation defense (see below for additional information).

### ADMISSIONS

The decision to admit a student to a doctoral program in electrical engineering who has earned a bachelor's or master's degree in Electrical Engineering is based upon several factors, including the applicant's GPA, test scores, and application packet. Please refer to the information below for the minimum required GPA and test scores.

Students with a grade point average of 3.6 or better from a US ABET-accredited electrical engineering undergraduate program may apply directly to the PhD program. A previous master's degree is not required to enter the direct PhD program. Strong students from reputable international programs may be considered for the direct PhD program if they have a PhD graduate advisory committee chair that will support them with a 0.25 RA at a minimum.

In addition, international students may be considered for the direct PhD after one semester of full-time residence in the MS or MSE program at ASU and no later than the beginning of their third semester of graduate studies. Such students are eligible if they have earned a GPA of at least 3.5 in ASU courses that are listed in their MS/MSE plan of study. It is implied that the earned credit in this evaluation period will not only include course work like Reading and Conference, research, thesis, or practicum credit, but will include credit from regularly scheduled courses. If you have credits that were not included in a previous degree, they may be evaluated for potential transfer credit following the policies from Graduate College.

#### Domestic applicants

In general, a student must have a least a 3.0 grade point average (out of 4.0) in all undergraduate course work and at least a 3.5 grade point average in all graduate course work for admission to the PhD program.

A student whose undergraduate degree is from a US ABET-accredited institution is not required to submit GRE scores. After submitting the application, the applicant should email the advising office to have that task item waived. A student whose undergraduate degree is not from a US ABET-accredited institution must have the equivalent of at least a 3.5 grade point average in the last two years of undergraduate study and score at least 156 on the quantitative portion of the GRE.

#### International applicants

Applicants from non-US institutions must have the equivalent of a 3.6 grade point average and must have earned a score of at least 156 on the quantitative section of the GRE. In addition, a student must usually hold a master's degree before being admitted to the PhD program.

An applicant whose native language is not English must demonstrate proficiency in the English language by scoring at least 90 on the Internet Based TOEFL (iBT) exam, or an overall band score of 6.5 on the IELTS exam. International students seeking teaching assistantships must demonstrate proficiency in spoken English by scoring at least 24 on the speaking portion of the iBT or 50 on the ASU administered Speaking Proficiency English Assessment Kit (SPEAK).

### Deadlines

For the fall semester, preference is given to complete ECEE graduate applications received by **December 31**. Admission results should be available by March 1. Applications received after this preferred deadline will be considered.

For the spring semester, preference is given to complete ECEE graduate applications received by **July 31**. Admission results should be available by October 1. Applications received after this preferred deadline will be considered.

### Campus options

The EE and EE (AME) PhD programs are only offered in person at the Tempe campus.

### GPA Requirements

In order to graduate, a grade point average of 3.5 or greater is required for all courses taken beyond the master's degree. Students might be required to take additional courses in order to raise their GPA to at least 3.5.

## DIRECT PHD COURSE REQUIREMENTS

Direct PhD students are required to complete 84 semester hours of academic credit beyond the bachelor's degree. Students should speak with their committee chair to determine what classes they should complete in order to support their research needs. The following table illustrates the direct PHD degree course requirements:

DESCRIPTION	NUMBER OF HOURS	COMMENTS
Master's in passing	30	Required to take 10 classes following the MSE degree requirements.
500 level or above	12	Four classes of 3 or 4 credits each. EEE 591 is not allowed. No more than one EEE 790 (Reading and Conference) is allowed.
Research or omnibus	18	500 level (and above) classes. EEE 591 is allowed
Research	12	EEE 792 (Select your chair from the course listing)
Dissertation	12	EEE 799 (Select your chair from the course listing)
<b>Total hours required</b>	<b>84</b>	

### Master's in Passing for Direct PhD students

Direct PhD students can apply for a master's in passing (MIP). The master's degree in passing will be the MS degree. The degree must be requested by the student through their academic advisor. The student must have completed 10 courses (following the EE MSE degree requirements) with at least a 3.0 GPA and the PhD Qualifying exam.

After completing 10 courses and the PhD Qualifying Exam (form and report are required to be submitted to the academic advisor), students should work with their academic advisor to have the proper form submitted to Graduate College. Once that is approved, the student will need to complete the MS iPOS that lists the 10 classes completed and apply for graduation.

Once the MIP is awarded, students are still active in the PhD program unless they withdraw from the program.

### REGULAR PHD COURSE REQUIREMENTS

PhD students are required to complete 84 semester hours of academic credit beyond the bachelor's degree. Students should speak with their committee chair to determine what classes they should complete in order to support their research needs. The following table illustrates the PhD degree course requirements:

DESCRIPTION	NUMBER OF HOURS	COMMENTS
Master's degree	30	From any approved institution
500 level or above	18	At least six classes of 3 or 4 credits each. At least 9 credits of EEE classes. EEE 591 not allowed. No more than one EEE 790 (Reading and Conference)
Research or omnibus	12	500 level (and above) classes. EEE 591 is allowed
Research	12	EEE 792 (Select your chair from the course listing)
Dissertation	12	EEE 799 (Select your chair from the course listing)
<b>Total hours required</b>	<b>84</b>	

### ELECTRICAL ENGINEERING (ART, MEDIA AND ENGINEERING) PHD

The concentration in arts, media and engineering has been established as collaboration between the electrical engineering program at ASU and the Herberger Institute for Design and the Arts. The AME program represents an ambitious interdisciplinary research community at ASU that is focused on the parallel development of media hardware, software, content and theory. AME research addresses the discontinuity that exists between media content and media technologies through a paradigm shift in media and arts training. The objective is to produce a new kind of hybrid graduate student who draws creativity from the arts and methodology from engineering sciences. AME trains students to integrate principles of digital signal processing and multimedia computing with artistic ideas and objectives, with the goal of enabling new paradigms of human-machine experience that directly address societal needs and facilitate knowledge. More information can be found on the [ECEE](#) website

The EE (AME) PhD program generally follows the EE PhD requirements with the exception that 2/3<sup>rd</sup> of the coursework, research, and dissertation credits be EEE and the remaining 1/3<sup>rd</sup> must be AME. For example, if a student must complete six courses, four of the courses must be EEE courses and the remaining two courses must be AME courses. The same pattern follows for research and dissertation credits.

## **QUALIFYING EXAMINATION**

Every student who wishes to pursue the PhD in electrical engineering must pass a Qualifying Examination. The goals and purpose of the PhD Qualifying Exam are:

- Encourage students to participate in doctoral level research in their first year of the program
- Require dialog between the student and their faculty advisor (committee chair) on expectations, research, and requirements
- Prepare students to present and defend their research, as they will need to do in their PhD Comprehensive Exam and Dissertation Defense
- Assess students' ability (or lack of ability) to do doctoral level research
- Maintain consistent standards for ECEE students and all faculty members on a student's committee regarding research requirements
- Determine if the candidate will continue (pass) or be removed (fail) from the program

Because the PhD is primarily a research degree, the Qualifying Examination is designed to test the candidate's research skills and abilities. The exam consists of a written research paper and an oral presentation of the research. When determining a topic, the student and their committee chair should keep in mind that this milestone is to determine if a student is qualified to do doctoral level research and if they would be successful in future research endeavors. The exam is administered by the student's graduate supervisory committee. While a written research paper is required, the contents, structure, and length are determined in conference with the student's PhD Faculty advisor.

PhD students who have a master's degree should aim to complete the qualifying exam by the end of their second semester in the program. Direct PhD students should aim to complete the qualifying exam in the semester in which they are completing their 10<sup>th</sup> course. If a student does not wish to take the exam according to the above schedule, but wishes to continue in the program, must petition the Graduate Program Chair for permission to take the exam at a later date. Petitions must be received well in advance of the required exam date. There is no guarantee that the Graduate Program Chair will approve such requests.

If a student is completing their MS thesis at ASU and would like to use their MS thesis defense as their qualifying exam, they may submit the required form with the signatures and exam information at the time of their defense. If the graduate supervisory committee advisor is not changed, this exam will be supervised by the MS committee. These members may, or may not, be part of the doctoral graduate supervisory committee. If the doctoral advisor is not part of this committee, the advisor should be added to the committee. At the time of the defense, the committee needs to be aware that they need to evaluate the student's MS Thesis at the doctoral level. The supervisory committee has a duty to ask questions about the PhD plan and probe diligently to determine if the student is prepared to put in the time, the effort, and is the student qualified to be in the PhD program.

The exam is graded on a pass/fail basis. A passing grade indicates that the committee believes that the student is capable of doctoral research. A failing grade indicates that the committee believes that the student is incapable of conducting the level of research required for the PhD. As a result, students who fail the exam will be removed from the program. The student must submit their report to their committee at least 10 working days in advance. Once the exam is completed, the student

must submit the form (which can be found on our website) and a copy of their report to their assigned academic advisor.

To schedule their qualifying exam, students should follow the guidelines below and coordinate with their committee

- Discuss potential committee members with faculty advisor if committee members have not already been selected.
- Update committee members in the iPOS to ensure they are approved to serve on your committee.
- Once the iPOS is approved, proceed with scheduling the exam.
  - Email each committee member with a copy of the research thus far separately while copying their advisor regarding their exam
  - Once each committee member has approved holding the examination, then confer a date & time with the committee that is in the near future, create a poll of potential dates and times
  - Once a date and time has been selected, re-confirm with all committee members and the chair of the committee
    - NOTE: You should schedule your qualifying exam **at least** 2 weeks in advance to allow the committee members time to review your research.
  - Create a calendar invite for all committee members and ensure they have received it.
    - If needed, schedule a conference room or schedule a zoom meeting and ensure that information is in the calendar invite.
  - Send a copy of the written report to the entire committee at least 10 days before the exam.
  - Send two reminders to the entire committee- a week before and a few days before the exam.
  - Send the slides to the entire committee the day of the exam.
- After the exam has been held, the student is responsible for initiating the required form (which can be found on the [ECEE Forms website](#)) and including a copy of their written report (not their slides)

## **COMPREHENSIVE EXAMINATION AND ADMISSION TO CANDIDACY**

A student must pass a comprehensive examination before being formally admitted to candidacy for the PhD. The examination is administered by the student's graduate supervisory committee after the student has essentially completed coursework. The student must have an approved iPOS before taking the exam. The exam is typically completed in the 6<sup>th</sup> semester of study at ASU. If the exam is not completed by the end of the 6<sup>th</sup> semester, approval for registration must be obtained by your committee chair and the Graduate Program Chair.

The comprehensive examination will be given by the four members of the supervisory committee and will consist of written and oral parts. The written part will be composed of a background paper on the area of research, includes the current status of this area, a summary of work the student has already done, and a thesis proposal. The oral part will be an examination on the contents of the paper in general and thesis proposal.

Following completion of the exam, student will fill out and submit the "PhD Comprehensive Examination" form (which can be found on the [ECEE Forms website](#)) to the Graduate Program Chair. The student will be granted candidacy by Graduate College immediately after passing the comprehensive exam.

## **DISSERTATION DEFENSE**

Upon completion of the dissertation, the student must successfully defend it by passing an oral examination. This defense may be conducted no earlier than one semester after the student's admission to candidacy. Ideally, the exam should be conducted no earlier than six months after the student's formal admission to candidacy.

Students are responsible for communicating with their committee chair when determining if they are ready to hold their dissertation defense. If the committee chair determines the student's work is sufficient, the student should send a copy of their dissertation to their committee members and work to find a date and time that works for the entire committee to attend the defense. Students are responsible for knowing the deadlines set by Graduate College when scheduling their defenses. Information can be found on the [Graduate College](#) website.

Students must formally schedule their defense through the iPOS at least 10 business days prior to their defense date. When doing so, they should upload their dissertation for format review. No exceptions to this rule will be made. In addition, the thesis must be delivered to all committee members at least 10 calendar days before the oral defense. At least 50% of the committee, including the chair or one co-chair, must attend the defense. Members attending remotely must be reported at the time of scheduling your oral defense.

A list of archival publications published by the student and related to the dissertation must be presented at the defense. The form for this is located at on the [ECEE Forms](#) website. The form must be signed by the PhD committee and submitted to the advising office to keep on file.

## **Supervisory Committee**

Sometime during the first semester in the PhD program the PhD student must form a graduate supervisory committee. The chair of the committee will be the faculty member who directs the student's research program. The chair of the committee must be a member of the electrical engineering program graduate faculty with endorse-to-chair approval. The [Graduate Faculty](#) list is maintained by Graduate College.

The supervisory committee will be composed of at least four members (the chair and the other members). Only three members need to attend the qualifying exam, but at least four must attend the PhD comprehensive exam and the final dissertation oral. At least half of the committee members must be tenure or tenure track faculty in ECEE.

## **RESEARCH AND DISSERTATION CREDITS**

A student is expected to become an active participant in a research program during the first semester of study in the PhD program. Research leading to a dissertation is performed under the direction of the supervisory committee. The candidate must register for a total of at least 12 credits of research (EEE 792) and 12 credits of dissertation (EEE 799). Research (EEE 792) will be graded with options of C, D, E, Z, or Y. A grade of Y indicates satisfactory progress and is at the discretion of the committee chair. Such grades may later be changed to a letter grade or left on the permanent record. The Y is the usual grade for research. The Z grade is typically used for dissertation credits until you complete your dissertation defense.

When the dissertation is satisfactorily completed, a grade of Y is given for successful completion of the dissertation and for passing the oral dissertation defense. If a student does not complete the dissertation, the dissertation advisor may assign a failing grade of E for EEE 799.

## **PALAIS OUTSTANDING DOCTORAL STUDENT AWARD**

The Palais' Outstanding Doctoral Student award is presented to the top graduating PhD student each year. The award includes a plaque and a check for \$1000. Faculty can nominate their graduating students once a year. Nominees should have high GPAs, several publications, and a strong nomination letter. The Graduate Program Chair will email all faculty when the nomination period is open. The awardee is chosen by a faculty selection committee from the list of nominees. The award is presented at the Ira A. Fulton Schools of Engineering spring convocation. Past winners can be viewed on the [ECEE](#) website.

## **GRADUATE CERTIFICATES**

### **NUCLEAR POWER GENERATION CERTIFICATE**

The Nuclear Power Generation (NPG) graduate certificate is a multidisciplinary professional certificate. This certificate can be completed online or at the Tempe campus. The graduate-level certificate program requires 15 hours of coursework with a minimum of two-thirds at the 500-level or higher. Students must complete three required courses (EEE 562, EEE 563, and EEE 564) and two electives. More information on courses can be found on the [ECEE](#) website.

### **SENSOR AND SIGNAL PROCESSING CERTIFICATE**

The Sensor and Signal Processing (SenSIP) graduate certificate is a multidisciplinary professional certificate. This certificate is offered at the Tempe campus. The graduate level certificate program requires 16 hours of coursework. Students must complete four core courses (EEE 509, EEE 554, EEE 517, and EEE 556) and two electives. More information on courses can be found on the [ECEE](#) website.

## **ACADEMIC STANDARDS AND POLICIES**

### **INTERACTIVE PLAN OF STUDY (IPOS)**

All students are required to submit their plan of study (POS) through the Interactive Plan of Study (iPOS) system by the end of their first semester of studying at ASU. Failure to do so might result in a hold being placed on the student's account that would prevent registration. The purpose of the iPOS is to assist the student, their staff advisor, and dissertation/thesis chair track the student's progress through their graduate program and ensure all degree requirements are met.

When a student submits their iPOS, they must list courses that will meet their program's degree requirements (as stated in this handbook) and the anticipated semester the courses/credits will be completed. The iPOS should be updated every semester after the student has registered for the next semester in order to ensure the courses that the student has registered for are approved and meet their degree requirements. Students should think of registration as a two-step process after their first semester- register for classes and then immediately update their iPOS. Doing this will ensure that the student does not miss any degree requirements. A list showing the planned course offerings for the next three-year time period is available on the [ECEE](#) website.

International students on an F1 student visa should list the appropriate Curricular Practical Training (CPT) credits on their initial iPOS. Please refer to the CPT section of this handbook for policies. If a student does not complete an internship in the semester that the credit is listed in on their iPOS, the credit can be removed from the iPOS.

Thesis and doctoral students are required to have their committee chair approve their iPOS. Either the Academic Advisor or the student can obtain approval, either through the iPOS system or via email.

## **TIME LIMIT TO COMPLETE A GRADUATE DEGREE AND PRE-ADMISSION CREDIT POLICY**

All master's students must complete their degree requirements within six years of being admitted to their program. All doctoral students must complete their degree requirements within ten years of being admitted to their program.

Up to twelve semester hours of transfer credit may be applied to the plan of study. The transfer courses must have been completed within three years of the semester and year of admission to the electrical engineering degree program. These courses cannot have been used towards the completion of another degree program.

## **CONTINUOUS ENROLLMENT AND LEAVE OF ABSENCE (LOA)**

Graduate students must be continuously registered each Fall and Spring semester. A student who interrupts a program without obtaining a leave of absence before the semester started will be automatically removed by Graduate College. If removed, the student may reapply for admission. Students planning to discontinue enrollment for a semester or more must request approval for a leave of absence from Graduate College. To request a leave of absence (maintain continuous enrollment), you must be in good academic standing. Students requesting a LOA who are not in good academic standing will need to reapply for admission. An official approved leave of absence will count as continuous enrollment. All requests need to be submitted prior to the start of the semester, and requests can be placed through your iPOS, under the "Petition" tab.

## **ACADEMIC INTEGRITY**

At Arizona State University academic honesty is expected of all students in all examinations, papers, lab work, assignments, academic transactions and records. The possible sanctions include, but are not limited to: appropriate grade penalties, loss of registration privileges, disqualification and dismissal. ASU strictly adheres to the academic integrity policy. This policy sets forth the ASU Student Academic Integrity Policy and appeal procedures. The policy can be found on the [University Provost](#) website. Additional information and resources can be found on the [Ira A. Fulton Schools of Engineering](#) website.

## **PROBATION, GPA REQUIREMENTS, AND SATISFACTORY ACADEMIC PROGRESS**

Academic excellence is expected of graduate students. To be eligible for a graduate degree, a student must achieve a grade point average of 3.0 or better in all work taken for graduate credit, exclusive of deficiencies, and in all work specifically included on the plan of study. The required

grade point average for master's students is 3.0; however, doctoral students must maintain a grade point average of 3.5.

Three different grade point averages that are considered by Graduate College are

1. Cumulative GPA: GPA from all classes taken once admitted into a graduate program.
2. Graduate GPA: GPA from all graduate level classes taken at ASU, regardless of when they were taken.
3. iPOS GPA: GPA from all courses and credits listed on the student's iPOS

A student who is not progressing satisfactorily toward a degree may be withdrawn from the program by Graduate College upon recommendation by the program. The policy of the Ira A. Fulton Schools of Engineering for academic probation and dismissal of graduate students is outlined below.

A PhD student may be recommended for dismissal from the graduate program who fails to make satisfactory progress toward the degree. Satisfactory progress means completing the PhD requirements in a timely manner. These requirements include the Qualifying Exam, Comprehensive Exam, dissertation defense, course requirements, selection of a chair and supervisory committee, filing of a plan of study, and completing research as assigned by the supervisory committee chair. Additional requirements may be imposed by the supervisory committee.

For grading policies, please refer to the University Registrar Services [Grading Policy](#) website. The grade of "I" (Incomplete) can only be given by an instructor when a student is unable to complete a course because of illness or other conditions beyond the student's control. The [Request for Grade of Incomplete](#) form must be submitted to the ECEE graduate advising office and approved by the Graduate Program Chair before the incomplete grade is posted by the instructor.

## **IRA A. FULTON SCHOOLS OF ENGINEERING ACADEMIC STANDARDS**

### *Policy for Maintaining Satisfactory Academic Progress:*

A student who has been admitted to a graduate degree program in the Ira A. Fulton Schools of Engineering, with either regular or provisional admission status, must maintain a GPA of 3.00 or greater in all the following:

1. all work taken for graduate credit (courses numbered 500 or higher)
2. coursework in the student's approved plan of study
3. all postbaccalaureate course work taken at ASU (overall GPA)

A student will be placed on academic probation if one or more of the student's GPAs listed above is less than 3.00. Students will be notified by mail when placed on academic probation.

A student will earn academic good standing by obtaining a 3.00 or greater in the GPAs listed above by the time the next nine hours are completed. Coursework such as research and dissertation and any course that is graded with a "Z" (in progress) or "Y" (satisfactory) cannot be included in these nine hours.

A student may be recommended for dismissal from a graduate program if the student fails to increase all the GPAs listed above to 3.00 or greater by the time he or she completes at least nine

credit hours as defined in the previous paragraph. If the deficient GPA has not increased to 3.0 or better, the ECEE Director and Program Chair will advise the Graduate College to review student's file for academic dismissal.

A student may appeal actions concerning dismissal by petitioning the program in which they are enrolled.

Academic units in the Ira A. Fulton Schools of Engineering can expand this policy statement to include additional policy governing the satisfactory academic progress of the students in their graduate programs.

## CPT (INTERNSHIP) POLICIES

**Catalog description:** Structured practical experience following a contract or plan, supervised by faculty and practitioners.

Internship (EEE 684) may be required for inclusion on the official plan of study for some electrical engineering students. This is determined in consultation with the Graduate Program Chair. The Curricular Practical Training (CPT)/internship is a **learning experience** for the student as they look to merge their **academic** knowledge with field experience. Internship may be necessary if the student needs practical engineering experience to complete qualifications for an advanced degree, needs industrial experience to gain the ability to perform required degree thesis research, or needs the use of unique industrial facilities not available on campus to complete a thesis research study. Students must complete two semesters of academic course work on an F1 visa at an approved institution in the US before becoming eligible for a CPT/internship. Internship credits need to be listed on a student's iPOS before they begin their CPT/internship.

MS thesis and PhD students must provide an updated, approved by faculty chair, iPOS to the department before they can submit their CPT paperwork for approval. The internship must relate to the student's research or studies.

Internships may be part time or full time. A part-time Internship requires 20 hours of employment per week. A full-time Internship requires 40 hours employment per week. For those students who are on a F-1 visa, you cannot have over 12 months of CPT time or you will become ineligible for Optional Practical Training (OPT).

Internship is only available to full-time, on campus students.

Students who wish to pursue a CPT/internship during their last semester, may do so as long as they have at least one course (3 or 4 credit hours) to complete that semester (MSE) or if they need the experience from the internship to complete their research (MS Thesis or PHD). Internship is not permitted for MSE degree students after all classes for the plan of study have been completed. Per ISSC, the student is then eligible for Pre-OPT.

Internship registration is for one credit hour per semester for an **academic/learning** experience. CPT for the master's degree is limited to no more than two semesters or one semester and a single summer session. Internship for the PhD degree is limited to no more than four credits. Internships do not need to be consecutive.

All application materials for Internship must be completed by the last day of regular registration for any semester as stated in the [Academic Calendar](#). Internships cannot start before the first official

day of the semester or session that the student is requesting. Students must receive all approvals from their academic advisor, thesis/dissertation committee chair (if applicable), and from the Graduate Program Chair. An approved plan is required before commencing the internship. The request will include a statement from the employer that indicates they understand that the Internship work is to satisfy a degree requirement. Required forms are available on the [ECEE CPT](#) website. Please note that all signatures must be original and submitted using DocuSign.

During any regular semester (Fall or Spring), a student on CPT must be registered full time unless completing their final semester. Interns not taking regular classes during this time can enroll for Practicum (EEE 680). The work required for the Practicum is just that involved with the Internship itself. The required employer evaluation report verifies the work was completed in a satisfactory manner. Internship (EEE 684) credit also counts towards the full-time requirement. For a summer internship the student needs to register for only one credit hour of Internship.

Internship is intended as a unique new learning experience, apart from a regular engineering position. Therefore, it is not available to full or part-time workers regularly employed by the company where the internship is proposed.

After the internship ends, the industrial supervisor must submit a report verifying satisfactory performance by the student. The last step in completing the internship is submission of the evaluation report to the Electrical Engineering Graduate Program Chair, who notifies the registrar of course completion.

**Physical Presence Requirement:** Per F1 visa regulations, students must have a physical presence on campus. Students who are completing an internship out of state may meet this requirement with in-person or hybrid courses. Students could also register for reading and conference (EEE 590 or EEE 790) if their plan of study permits it. Please refer to your program's degree requirements.

## FINANCIAL

### TEACHING AND RESEARCH ASSISTANTSHIPS

Graduate students admitted with regular status may apply for teaching or research assistantships (RA). International students seeking teaching assistantships (TA) must demonstrate proficiency in spoken English by scoring at least 24 on the speaking portion of the TOEFL, 7.5 on the speaking portion of the IELTS, or 50 on the SPEAK Test administered by Global Launch at ASU.

Because of the many benefits of holding a TA or RA position, they are sought after by many of our students and the applicant pool is highly competitive based on limited positions available. Applicants who are qualified are judged primarily on grade point average, recommendations by faculty members, and English-speaking scores. Preference is usually given to PhD students, particularly those who have passed the Qualifying Examination. Graduate assistants typically work 20 hours per week, as compensation for their work, they may receive a salary, an out-of-state tuition waiver, and a portion of in-state registration fees.

Research assistantships are awarded by the individual faculty members. Those students desiring research assistantships should review the faculty areas of interest and contact the appropriate professors. Students obtain research assistantships by directly contacting a faculty member who is conducting sponsored research in their area of interest. It is unprofessional to unselectively (or randomly) send messages to all faculty seeking financial assistance.

Usually, MSE students may receive teaching or research assistantships only if they switch to the MS program and have their thesis work overseen by the faculty member.

All TA's and RA's in the Ira A. Fulton Schools of Engineering must register for 12 credits each semester. Audit hours are not allowed. However, a student will not usually attempt more than nine credits of actual course work each semester. At the master's level, TA/RA's may fill in their programs with Research (EEE 592) or Thesis (EEE 599). For the PhD, TA or RA's may fill in their programs with Research (EEE 792) or Dissertation (EEE 799). TA's at all levels may fill in their programs with Practicum (EEE 680).

PhD students holding RA or TA positions must enroll for a minimum of two classes from their plan of study each during their first two semesters. MS students holding RA or TA positions must enroll for a minimum of two classes from their plan of study during their first three semesters.

Students are responsible for understanding their position is and reading the contents in their offer letter. If students have questions about their position, they need to speak with their faculty and their faculty's payroll representative. If students are in their last semester, they should check in with their faculty and their faculty's payroll representative within the department to ensure their position is correct based on their needs.

## FELLOWSHIPS, GRANTS, AND OTHER FINANCIAL AID OPTIONS

Graduate students are encouraged to seek out all financial aid opportunities available to them. Below is a list of some options students should review, but should not consider this as a comprehensive list

- The [Dean's Fellowship](#) provides tuition, health insurance, and a stipend for four years to incoming domestic PhD students. Faculty must nominate a PhD student for this award.
- The [University Graduate Fellowship](#) (UGF) program is designed to further the goals of excellence and diversity in the doctoral program. These awards are for recruiting outstanding new PhD students and for aiding students in completion of their doctoral dissertations. Faculty must nominate a PhD student for this award.
- The [Fulton Fellowships and Funding program](#) provides additional funds for attracting new PhD students. Faculty must nominate a PhD student for this award.
- The [Financial Aid Office](#) has information on how students can apply for scholarships and information on eligibility.
- [Graduate College](#) has several funding opportunities for students
- [Graduate and Professional Student Association](#) has several funding opportunities that our students can apply to.

## TUITION AND FEES

Tuition and fees are subject to change. Students are responsible for monitoring the charges on their account and making payment in accordance with the Student Business Services policies. Please refer to the [Student Business Services](#) website and the [Tuition Estimator](#) for information on tuition and fees. **By registering for classes, you agree to pay all applicable tuition and registration fees. If you plan to leave the university, you must officially withdraw to cancel registration before the refund deadline.** Refund deadlines are available on the [Important Dates](#) calendar. Please ensure that you have dropped or withdrawn from all classes during the 100 percent refund period or you will be responsible for the tuition charges. See the [Tuition Refund Policy](#).