Carnegie Mellon University
Electrical & Computer Engineering

MS Student Handbook – Pittsburgh

Department of Electrical & Computer Engineering

Academic Year 2024-2025

Carnegie Mellon University
5000 Forbes Avenue
Pittsburgh, PA 15213-3890
(412) 268-2000
www.cmu.edu

TABLE OF CONTENTS

WELCOME TO ELECTRICAL AND COMPUTER ENGINEERING

Welcome to the Department of Electrical and Computer Engineering at Carnegie Mellon University. Since offering our first course in electrical engineering in 1908, our research and teaching has expanded to cover areas as broad as device sciences and nanotechnology, computer systems, data science, energy, control, communications, and circuits. The 2024 *US News and World Report* ranked our graduate programs in electrical engineering and computer engineering 7th and 5th in the nation, respectively, and we offer programs in Pittsburgh, Silicon Valley, Portugal, Thailand, and Africa.

Our distinguished faculty work closely with students to push the boundaries of technology and to shape the future of energy systems, bio-electronics, computing, data storage, and much more.

While this handbook is specific to your academic experience in the department, it is just one element of the Graduate Student Handbook Suite. There are several other resources within the suite that you should consult when needed:

- Your Program Handbook
- The College of Engineering's Handbook
- University-Wide Graduate Student Handbook (Office of Graduate & Postdoctoral Affairs)
- The Word Student Handbook

Information about The Word, the student handbook, the Office of Graduate and Postdoc Affairs, the Office of the Dean of Student Affairs and others are included in Appendix A of this handbook.

Please do not hesitate to contact us if you have any questions or comments.

Sincerely,

Larry Pileggi
Coraluppi Head and Tanoto Professor
Electrical and Computer Engineering

Core Values

The ECE Department has been a leader in both research and education for years; it is known for its innovative qualities, boldness of ideas, and unbridled enthusiasm. Our strategic plan is guided by our core values.

We value scientific truth, creativity, quality, innovation, and engineering solutions, all within a diverse and inclusive community guided by respect and joy of doing.

Our core values form the foundation for what we do; we hold them to be intrinsically true. We believe in solving problems that have large societal impact. We also believe that to be successful, we must work within an environment of enthusiasm and openness, respect and integrity, and freedom to express and explore a variety of ideas.

Vision

Carnegie Mellon University will have a transformative impact on society through continual innovation in education, research, creativity, and entrepreneurship.

Mission and Objectives

The ECE Department mission is:

To inspire, educate, and produce electrical and computer engineers capable of tackling fundamental scientific problems and important societal challenges, and to do so with the highest commitment to quality, integrity, and respect for others.

We aim to be the best at what we do, to apply all our skills and knowledge to execute our vision. We educate young people to become engineers sought after by industry and academia alike; we do so in an environment imbued by enthusiasm and love for what we do, with respect and willingness to listen to each other, with freedom to express our ideas and look at challenges from different points of view. We strive to be the ECE department of choice for those who are willing to step off the beaten path, for the visionaries and dreamers.

Students in the Master's of Science in Electrical and Computer Engineering program are provided with a thorough background in the fundamentals of electrical or computer engineering, as well as the opportunity for in-depth specialization in some particular aspect of these fields. Upon enrollment in the department, students are given the opportunity, with the help of an academic advisor and faculty mentor, to choose an educational program that is consistent with their background and is best suited to their own academic goals.

Students in the Master's of Science in Artificial Intelligence Engineering – Electrical and Computer Engineering complete a shared core across the entire College of Engineering and learn about the AI Enablers (infrastructure needed to realize AI engineered systems), Producers (tools that go beyond black box and align with physical systems) and Consumers (use and analyze AI/ML for domain applications).

Philosophy

The Department of Electrical and Computer Engineering (ECE) at Carnegie Mellon University is dedicated to providing a world-class, transformative educational experience to the broadest

possible student community. We foster an inclusive environment of learning, research, creativity, and collaboration, embracing and creating successful paths for students of all backgrounds and learning styles. Focused on both theoretical and applied studies, the ECE department incorporates ethics, fairness, and entrepreneurial thinking into all of its courses. We build innovative systems of every scale and scope that provide wide-reaching societal benefits, ensuring our work on campus has impact beyond the university's traditional borders.

INTRODUCTION

Graduate Degrees and Programs Offered

Master of Science in Electrical and Computer Engineering – Standard Program
- Pittsburgh
- Silicon Valley
- Thailand
- Africa

Master of Science in Electrical and Computer Engineering – Applied Study[*]
- Pittsburgh
- Silicon Valley

Master of Science in Electrical and Computer Engineering – Advanced Study
- Pittsburgh

Master of Science in Electrical and Computer Engineering – Applied Advanced Study[*]
- Pittsburgh

Master of Science in Software Engineering – Standard Program
- Silicon Valley

Master of Science in Software Engineering – Applied Study[*]
- Silicon Valley

Master of Science in Artificial Intelligence Engineering – Electrical and Computer Engineering
- Pittsburgh

Doctor of Philosophy in Electrical and Computer Engineering
- Pittsburgh
- Portugal
- Thailand
- Washington, D.C.

Please note: The instruction for all degrees and programs will occur in English.

---

[*] Available to students matriculating Fall 2020 to Spring 2023

Graduate Student Catalog/Handbook

This catalog/handbook is intended to set guidelines and expectations for new and current Master's students in the Department of Electrical and Computer Engineering at Carnegie Mellon University (CMU). This catalog/handbook is not exhaustive and is subject to revision at any time by the ECE department. It covers Master's students in Pittsburgh.

It is the responsibility of each student to read and understand the contents of this catalog/handbook.

This catalog/handbook, along with any revisions, will be posted and announced annually to the ECE website. Students with disabilities may request this catalog/handbook in other formats by contacting the Advising and Academic Services Center.

<h1 style="text-align:center">DEPARTMENTAL INFORMATION</h1>

Personnel

Throughout a student's time in the MS program, they will encounter a variety of faculty and staff who will help them on their way to completing their degree. Students may view a list of faculty and a list of staff affiliated with ECE online. Below is a list of faculty and staff whom students are likely to encounter during their time in the MS program.

- Dean of the College of Engineering: Professor William Sanders
- Associate Dean of Graduate and Faculty Affairs: Professor Lisa Porter
- Department Head: Professor Larry Pileggi
- Director, Office of the Department Head: Kimmy Nguyen
- Interim Director, CMU-Africa: Professor Conrad Tucker
- Associate Department Head for Research: Professor Shawn Blanton
- Associate Department Head for Academic Affairs: Professor James A. Bain
- Associate Department Head for Students: Professor Tamal Mukherjee
- Director of Finance and Sponsored Research: Charlotte Ambrass
- Director of Admissions and Academic Affairs: Tara Moe
- Director of Advising and Academic Services: Megan V. Oliver
- MS/UG Academic Program Advisor: Danielle Bonatesta
- MS/UG Academic Program Advisor: Jeannette Daly
- MS/UG Senior Academic Program Advisor: Monique C. Moreland
- MS/UG Academic Program Advisor: Kaycee Palko
- MS/UG Senior Academic Program Advisor: Holly Skovira
- MS/PhD Senior Academic Program Advisor, Silicon Valley: Brittany Bristoll
- MS Academic Program Advisor, CMU-Africa: Olga Gikundiro Buki
- PhD Senior Academic Program Advisor: Greta Ruperto

A general list of contacts can also be found on the ECE website.

Department Resources

Academic Advising

Each student will have an *academic advisor* and a *faculty advisor,* listed in students' SIO portal, who work together as a team to best support their advisees.

The academic advisor is the main point of contact and a skilled staff member who serves as students' primary support in navigating their academic program. Academic advisors handle crucial compliance-related advising tasks, including tracking degree progress, certifying graduation, and completing enrollment and university-related paperwork. The academic advisors are Danielle Bonatesta, Jeannette Daly, Monique C. Moreland, Kaycee Palko, and Holly Skovira.

The faculty advisors are full-time, PhD-trained faculty members who can help students with things like technical questions, course selection, career guidance, finding research projects, working with instructors, and more. The faculty advisors are Professor Greg Kesden, Professor Tamal Mukherjee, Professor Bill Nace, Professor Asim Smailagic, Professor Tom Sullivan, and Professor Tom Zajdel.

The head of the ECE Advising Group is Professor Tamal Mukherjee, Associate Department Head for Students, who also serves as a faculty advisor. Megan Oliver, Director of Advising & Academic Services, reports to Professor Mukherjee.

Concerns and conflict with your academic advisor can be shared with the Director of Advising & Academic Services. Concerns and conflict with your faculty advisor can be shared with the Associate Department head for Students. Beyond this, students are encouraged to communicate with Professor James Bain, Associate Department Head for Academic Affairs, or Coraluppi Head and Tanoto Professor Larry Pileggi, the Department Head. Beyond the department all graduate students can communicate their concerns to Professor Lisa Porter, Associate Dean of Graduate and Faculty Affairs.

Graduate Studies Committee (GSC)

The Graduate Studies Committee is a committee consisting of ECE faculty and ex-officio administrators from the Student and Academic Affairs Office. The Graduate Studies Committee meets throughout the academic year to address student petitions, discuss program policies, and to approve and assign doctoral qualifying exams.

The GSC Chair for the 2024-2025 academic year is Professor Rohit Negi. Students should ask their academic advisor when this semester's GSC meetings take place.

Academic Services Center

The Academic Services Center (ASC) is ECE's home for course support. This includes course planning, scheduling, enrollment management, lab management, materials preparation and archiving, and additional administrative support. Graduate students may avail themselves of the ASC's Lab Specialist for assistance in borrowing and/or ordering lab parts for projects, as appropriate. Further information about the ASC is available on their webpage: https://www.ece.cmu.edu/academics/academic-services-center.html.

Bulletin Boards

Bulletin boards are located throughout the department in Hamerschlag Hall (HH), ANSYS Hall, Porter Hall, Robert Mehrabian Collaborative Innovation Center, and Roberts Engineering Hall. Bulletin boards will be cleared on a regular basis.

Shipping & Receiving

The ECE Shipping & Receiving office is located on the Pittsburgh campus in HH 1301 and its regular business hours are 9am-5pm, Monday through Friday. This office handles all incoming and outgoing packages for the department as well as the daily US Mail delivery. The ECE Shipping

and Receiving Department has a large stock of shipping materials to assist with any outgoing package needs, as well as prompt notification of package arrival and delivery if necessary.

Computer Clusters

Computer clusters are located in HH 1305, HH A101, and ANSYS 101, with preference given to any class meetings assigned in those spaces. There are several remote access computer clusters located in the ITS Cyert Hall machine room. Various research groups or principal investigators have their own computer clusters. Access to those clusters is only available with the consent of the party who owns the cluster.

Graduate Student Lounges

The main student lounge can be found in Porter Hall B-level (B48, B50, B52). Additional space for students to meet are available throughout the various buildings where ECE is located as well as all over the campus.

Department Office/Building Security, Repairs and Services

Any damages or repairs should be reported to Facilities Management Services, by emailing fixit@andrew.cmu.edu or calling 412-268-2910. For security concerns and in an emergency, please contact the University Police at 412-268-2323.

ECE Graduate Student Organizations

- **Build18**: Build18 is more than an annual hardware hackathon. It serves as an intellectual playground for the brightest and most creative of Carnegie Mellon's students. The event's mission is to provide students with a risk-free environment to pursue personal engineering challenges, where the only limiting factor to creation is their own ingenuity. This club offers information sessions and tutorials for students prior to their annual hackathons, as well as obtains industry sponsorships to purchase needed components Website: build18.org
- **EGO** (ECE Graduate Student Organization): Organizes academic and social events throughout the academic year. Website: https:/orgs.ece.cmu.edu/ego/
- **WinECE** (Women in ECE): Provides academic and social events to throughout the year. Website: https://winececmu.wixsite.com/winece
- **HKN** (Eta Kappa Nu): The honor society for Electrical and Computer Engineering students. Members engage in community service, professional engagement, and social activities. PhD students are invited by the board of HKN to join based on academic performance. Website: https://hkn.ece.cmu.edu
- **IEEE:** The student chapter of the Institute for Electrical and Electronic Engineers organizes social, technical and professional development meetings throughout the year. Website: https://orgs.ece.cmu.edu/ieee/
- **ECE Outreach:** Provides middle and high school students opportunities to learn about engineering and figure out whether it's a good career choice for them. The organization is run by ECE undergraduate and graduate student volunteers. Website: http://eceoutreach.ece.cmu.edu/index.html

- For more information on graduate student organizations and opportunities for future involvement in the ECE department, please send email to ece-student-orgs@andrew.cmu.edu.

Press & Media Relations

Kimmy Nguyen acts as the point-of-contact between news media and the ECE Department, including faculty, students, and staff. Kimmy can also provide guidance on internal and external relations and can assist with publicizing programs, projects, events, and other ECE affiliated activity. Students should contact the department head's office with any questions related to the use of ECE brand and logos.

PRE-MATRICULATION

Admissions Policies

For information about ECE's admission policies, including application requirements, application deadlines, and a link to apply, please visit these webpages:

- https://www.ece.cmu.edu/admissions/graduate-application-deadlines.html
- https://www.ece.cmu.edu/admissions/graduate-faq.html

English Language Requirements and Language Proficiency

Admission to Carnegie Mellon University graduate programs requires demonstration of completed, relevant undergraduate degree programs, as demonstrated by an original transcript from the degree-granting institution during the admission process. Domestic students who graduate from an accredited college or university in the US have demonstrated their English language facility and skill by their success and graduation from competitive undergraduate US institutions.

The DET, TOEFL or IELTS test is required of all international applicants whose native language is not English. Native language is defined as first language, or language spoken from birth. Language tests are not required if the applicant has graduated from a U.S. university or if the applicant is a CMU student or alumni. Please refer to the admissions FAQ for additional details.

Non-native English speakers may utilize the Language Support in the Student Academic Success Center for language support: https://www.cmu.edu/student-success/.

Deferral

ECE generally does not allow admission deferrals because admission decisions are based on the current applicant pool. Therefore, students are admitted into the program for a particular semester only. If a student wishes to attend in a future semester, the student must reapply to the ECE program.

Integrated Master and Bachelor students (IMBs) will be permitted to take up to a two year deferral between their bachelor's degree and their master's degree only if they have completed a minimum of 24 units towards their master's degree at the time of their undergraduate graduation.

Final Undergraduate Transcripts

Applicants admitted to any ECE program (except for CMU alumni) must submit final official transcripts, properly sealed, upon completion of their undergraduate program from the institution conferring their degree as a condition of enrollment at Carnegie Mellon. Certificates of graduation and/or degree certificates should also be submitted if provided by the institution. Failure to provide such documents that confirm the completion of undergraduate requirements by the end of the first semester of study at Carnegie Mellon may prevent the MS degree from being certified.

Residency

MS programs in the Department of Electrical & Computer Engineering are in-person programs with required in-person expectation coursework. US Government rules require this of any program admitting F-1 and J-1 international students. At present there are no online or remote offerings of the MS programs.

For international students, access to individual remote courses is governed by the policies of the OIE: https://www.cmu.edu/oie/maintaining-status/students/course-load-modality.html

Responsible Conduct of Research (RCR) Education

The Office of Research Integrity and Compliance website (https://www.cmu.edu/research-compliance/index.html) describes the university's position on ethical research: "Carnegie Mellon University promotes the responsible conduct of research through high standards of ethics and accountability in planning, conducting and reporting research. The responsible conduct of research is demonstrated through behavior that meets generally accepted standards. These standards are set forth by state and federal regulations, institutional policies, professional codes of conduct and personal convictions."

In support of the university's position, ECE requires **all incoming students** to take the appropriate online training offered by the Collaborative Institutional Training Initiative (CITI). The CITI physical science module package is recommended rather than the module package for engineers, although both are acceptable. The courses are available via CITI through the Office of Research Integrity and Compliance website. Students should select Carnegie Mellon University as the participating institution when creating an account. Website: https://www.cmu.edu/research-compliance/responsible-conduct/training.html

The course(s) may take a few hours to complete but can be done over a period of time. Upon completion of the course(s), students will need to provide their certificate to the advising team. Instructions on how to submit this certificate are communicated prior to the beginning of the semester.

ENROLLMENT AND REGISTRATION

Overview

After matriculating into ECE, students should create an academic plan and register for courses. Students should actively engage in this process by reviewing degree requirements on the website and connecting with their academic advisor and faculty mentor. Once plans are firm, students can proceed by accessing Student Information Online (SIO).

SIO is an important online tool to use during the registration process, as well as throughout graduate school. Students can access SIO with their Andrew ID at The Hub.

Within SIO, students can use the Course Planning module to view and modify their proposed schedule before registering for courses. Once a schedule is developed, it is the student's responsibility to register for courses using their SIO. Students must be registered for every course that they plan to take for the semester, even if it is not taken for credit (e.g. audited courses).

After the first semester, a student's assigned registration time is determined by the number of completed units and cannot be changed. If a student's tuition balance and/or fees are greater than $0.00, the student will not be able to register until the balance is cleared.

Degree Progress and Planning

Student Responsibility

It is the sole responsibility of the student to manage the academic progression of their program. Students are expected to ensure that they are taking the necessary prerequisites and courses to complete degree requirements on time. Students have the ability to add courses, drop courses, and select units for variable unit courses through SIO. It is the students' responsibility to be aware of all academic deadlines, including the add deadline, the drop deadline, the pass/no-pass deadline, and the audit deadline. Academic deadline information can be found in the Academic Calendar: https://www.cmu.edu/hub/calendar/index.html

If a student is not progressing as expected, they are expected to seek advice and counsel from their academic advisor. If the student is concerned that they are unable to complete degree requirements, they should contact their academic advisor for assistance.

Degree Requirements Timeframe

The duration of all ECE MS programs for students starting the program in Spring 2020 or prior is three full-time semesters (fall-spring-fall or spring-fall-spring). Students matriculating in Fall 2020 through Spring 2023 can choose to join the Standard or Applied programs for 3 full-time semesters or the Advanced Study or Applied Advanced Study programs for 4 full-time semesters. Students matriculating Fall 2023 or later can choose to join the Standard program for 3 full-time semesters or the Advanced Study program for 4 full-time semesters. Students applying to the Artificial Intelligence in ECE or Software Engineering degree programs are expected to complete their degree requirements in 3 full-time semesters. In order to have full-time status, students must enroll in at least 36 units each semester. In order to complete program requirements, students may need to enroll in more than 36 units per semester. The maximum number of units allowed in a semester is 48 units. Students are responsible for completing their enrollment each

semester via their Student Information Online (SIO) portal. Students who are not enrolled by the add deadline will be withdrawn from the university.

Students must be physically present and attend classes at the start of the semester. If extenuating circumstances exist that prevent a student from attending class, a student must notify the academic advisor and instructors immediately. Not attending class from the start of the semester will have a detrimental effect on a student's progress in the program. ECE will make an effort to verify all students have arrived to begin their program and will consider a student as "withdrawn from the university" if they are not here by the add deadline as stated in the academic calendar.

International students will be given a 16-month I-20 or DS-2019 for 3-semester programs or a 21-month I-20 or DS-2019 for 4-semester programs. International students must consult with CMU's Office of International Education (OIE) for questions on extension of their visa documents or if they complete their degree requirements in fewer than three semesters. Please see details and relevant forms on OIE's website under Maintaining Legal Status: https://www.cmu.edu/oie/foreign-students/maintain-legal-status/index.html

Summer Registration

Students who matriculated prior to Fall 2023 in the Applied or Applied Advanced Programs are required to complete a summer internship in their first summer semester of the program. In any subsequent summers in the Applied or Applied Advanced Programs, and for any summer semester(s) in the Standard or Advanced programs, students are not required to continue their studies as the summer semester is considered a vacation semester. However, students may choose to take courses for academic credit or pursue an internship that is relevant to their MS degree if appropriate.

Eligible international students who are completing an internship in the United States must complete the paperwork for Curricular Practical Training (CPT). Academic and OIE advisors will provide students with information about CPT during the spring semester. For more information about internships and CPT, see the "Internship" section outlined in this handbook and OIE's website on Employment Options for international students: https://www.cmu.edu/oie/foreign-students/employment.html

Full- and Part-time Requirements

The MS degree program is a full-time program in which students complete a minimum of 36 units each semester (including summer if summer is a student's final semester). Students who are interested and qualified may take an accelerated course load and complete the degree in two semesters; these students should consult with their primary academic advisor.

For international students, part-time master's enrollment requires an approved Authorization for a Reduced Course Load from the Office of International Education. International students must work with their academic advisor to submit an Authorization for a Reduced Course Load form https://www.cmu.edu/oie/docs/reduced.pdf. Such authorization is granted only in extenuating circumstances. Please note: due to the structure of the MS programs in the Department of Electrical & Computer Engineering, the fourth selection on this form (Student's Final Semester)

is not an option. Immigration regulations do not allow CMU to issue visa documents for a part-time program.

For domestic students, part-time master's enrollment in any non-terminal semester must receive departmental approval. Departmental approval requires submission of a detailed degree plan and is only granted in extenuating circumstances.

Campus Location Change

Students enrolled in the ECE Master's program at the Pittsburgh, Silicon Valley, or CMU-Africa locations may be eligible to request a change in residence to another campus after completing one semester of full-time study. Eligibility is determined by the details included in the student's admission offer and is explicitly stated in the admission offer letter. Due to limited space, location changes are not guaranteed and are subject to the discretion of the department. Students are responsible for all academic and financial impacts related to this change. Information about the location change process will be provided to eligible students.

International student internship eligibility will not be affected if students change location between Silicon Valley and Pittsburgh campuses. Location changes between U.S.-based campuses and CMU-Africa will have implications for internship eligibility for international students. Students should refer to OIE's website for employment options and consult with their OIE advisor for additional questions: https://www.cmu.edu/oie/foreign-students/employment.html

Change of Degree Program

Sometimes students begin their ECE master's program (M.S. ECE, M.S. AIE-ECE, or M.S. SE) and realize that they would like to transfer to a different degree program than the one they were admitted to. When this occurs, students may have the option of applying to transfer to another M.S. degree program within the ECE Department. Transfers may be possible from MS AIE-ECE or MS SE degree programs to the MS ECE degree program. Transfers from the MS ECE degree program to the MS AIE-ECE or MS SE degree programs require admission. Students must meet with their academic advisor to determine if this is possible. Information about the degree change application and process will be provided to the students at that time. All degree program change applications are reviewed by the ECE Admissions Committee and are subjected to the same admission standards as initial applications to the program. Program changes are not guaranteed. In the case where a program change will also result in a campus location change, students are subject to the same policies outlined in the Campus Location Change section in this handbook.

Students are not eligible to change degree programs until after they have successfully completed 36 units at CMU, and all applications will be considered for the following semester. Students are responsible for all academic and financial impacts related to the change. Prior to changing to a new M.S. degree program, international students should consult with OIE.

Changing between the MS ECE Standard, Applied, Advanced, or Applied Advanced programs is not allowed at any time. Similarly changes between MS SE Standard and Applied programs is not allowed at any time. Students will select their program upon acceptance of their admissions offer and must remain in their declared program until degree completion.

Internal Transfer to another Graduate Department within CMU

Students wishing to transfer to another graduate department within Carnegie Mellon University should consult with the admission staff of the intended transfer department for policies and procedures related to the potential transfer. Students should also alert their academic advisor regarding their intention to transfer. ECE shall share any necessary application materials (test scores, transcripts, recommendations, etc.) upon written request of the transferring student.

Courses Outside of Degree Requirements

Courses that do not satisfy degree requirements include StuCo courses (98-XXX), Physical Education course (69-XXX), audited courses, and pass/no-pass courses. Similar to courses taken for degree requirements, students must register for these courses and the units will count towards their course load for the semester. For a complete list of course restrictions, see the ECE website: https://www.ece.cmu.edu/academics/ms-ece/requirements.html.

Double Counting Courses

ECE follows the CIT Policy on double counting of courses. Students are required to notify the advising team prior to declaring a degree outside of ECE as this may have repercussions for units and coursework to date. Website: https://www.cit.cmu.edu/education/academic-policies/graduate-policies/registration-grading-credit.html#double-counting-of-course-units-for-m.s.-and-ph.d.-degrees

The same course taken two separate times will not count towards the ECE M.S. If a student takes the same course twice, only the course with the higher grade will be counted towards the ECE M.S. course requirements.

Maximum Units Allowed

Students who are pursuing the MS degree cannot register for their final semester if they have already completed 120 units (for a 3-semester program) or 156 units (for a 4-semester program) of coursework. These units include courses taken for audit or pass/no pass, and courses from which the student withdrew. Please refer to the CIT policy on MS degree units for additional information.

If it becomes clear that a student will exceed the maximum units and not be able to maintain the required 3.0 average, the student may be dismissed from the MS ECE, MS SE or MS AIE-ECE program.

Maximum Units Allowed Outside CIT

Students enrolled in a 3 semester MS ECE, MS SE, or MS AIE-ECE degree at all campuses may take no more than 12 units outside the College of Engineering towards meeting their degree requirements. Students enrolled in a 4 semester M.S. ECE degree may take no more than 36 units outside the College of Engineering towards meeting their degree requirements.

Courses will satisfy requirements based on the course number during the semester of registration. If a course number that is outside of CIT changes to be within CIT, the change will not be retroactive and the course will still qualify as being outside of CIT for all past semesters.

MS ECE Concentrations

Nine concentrations are available for M.S. in ECE students to choose from, allowing for focused study in a specific area of ECE (not available to students in the MS SE and MS in AIE-ECE degree programs). Students completing one or more of these concentrations should refer to their degree as a Master of Science in Electrical and Computer Engineering with a concentration in <name of concentration>. Students satisfying the requirements for more than one concentration may acknowledge all for which they fulfill the requirements.

All concentrations require a minimum of four ECE courses distributed across categories as described below. MS ECE students are not required to complete a concentration in order to graduate. Concentrations will not appear on the student's transcripts or diploma. The student's academic advisor can provide a signed declaration form to show the completion of one or more concentrations.

- AI/ML Systems (AIML)
- Intelligent Physical Systems (IPS)
- Computational Engineering Methods/Systems (CEM/S)
- Computer Security (SEC)
- Network/Distributed Systems (NDS)
- Wireless/Embedded Systems (WES)
- Integrated Systems (IS)
- Devices and Nanofab (DN)

For a list of approved courses within each concentration and faculty points of contact for each, visit the website: https://www.ece.cmu.edu/academics/ms-ece/concentrations.html

Retaking Courses

If a student does not pass a course, they should take a different course to fulfill the requirement. If a student is considering retaking a course, they should contact their academic advisor. Students may retake a prerequisite course in which they did not receive the minimum grade required to continue in a course sequence.

All grades are recorded on the transcript and factored into the cumulative QPA. However, only the best 97 or 133 units (depending upon program) that fulfill degree requirements are factored into the required 3.0 program QPA.

Auditing Courses

Auditing a course is registering for the course and being present in a classroom, without receiving academic credit or quality points. An audited course will appear on a student's transcript. Students may not regularly attend a course for which they are not registered.

A student who wants to audit a course is required to:

1. Register for the course in SIO.

2. Obtain permission from the instructor and ask the instructor to sign the course audit approval form: https://www.cmu.edu/hub/docs/course-audit.pdf

3. Submit the form to their academic advisor for approval.

4. If approved, the academic advisor will send the form to the HUB for processing.

Once a course audit approval form is submitted to the HUB, a letter grade ('A'-'R') will not be assigned for the course and the declaration cannot be reversed. Students can find the deadline for submitting this form on the Academic Calendar. After the deadline, students are not able to request the option to audit a course.

The extent of the student's participation must be arranged and approved by the course instructor. Typically, auditors are expected to attend class as though they are regular class members. Those who do not attend the class regularly or prepare themselves for class will receive a blank grade. Otherwise, the student receives the grade 'O', indicating an audit.

The units of audited courses count toward the maximum course load units, but do not count toward the degree requirements. If an audited course is outside the College of Engineering (CIT), those units count towards the limited units MS ECE students may take outside CIT. Any student may audit a course. For billing, an audited course is considered the same as traditional courses for tuition charges. If a part-time student audits a course, he/she will be charged part-time tuition based on the per-unit tuition rate for the course.

Pass/No Pass Courses

Students who wish to take a course pass/no pass are required to register for the course and submit the pass/no pass approval form (https://www.cmu.edu/hub/docs/pass fail.pdf) to their academic advisor for approval. If approved, the academic advisor will send the form to the HUB for processing.

Once a pass/no pass approval form is submitted to the HUB, a letter grade ('A' 'R') will not be assigned for the course and the declaration cannot be reversed. Passing work (letter grade 'A' 'C') is recorded as 'P' (passing grade) or 'S' (satisfactory) on the student's academic record, with both grades meaning the same thing. Work with a grade at or lower than 'C ' will not receive credit and will be recorded as 'N' (not passing grade) on the student's academic record. No quality points will be assigned to 'P'/'S' or 'N' grades; the units of 'P'/'S' or 'N' grades will not be factored into the student's semester, cumulative or program QPA.

The units of pass/no pass courses count toward the maximum course load units, but do not count toward the degree requirements. Students can find the deadline for submitting this form in the Academic Calendar. After the deadline, students are not able to request to take a course as pass/no pass.

Any student may take a course as pass/no pass. For billing, the course is considered the same as traditional courses for tuition charges. If a part time student takes a course pass/no pass, they are charged part time tuition based on the per unit tuition rate for the course.

COVID-19 Pass/No Pass Rule Exception

In response to the COVID-19 pandemic, the Provost's Office and Senior Leadership created a temporary modification to the grading policy for spring 2020. These changes were for the spring 2020 semester only and were made due to the impact of COVID-19. All undergraduate and

graduate students were permitted to convert any spring 2020 semester-length or mini-4 course final grade to pass/no pass during the Special Pass/No Pass Election Period. Any course grade converted to passing in spring 2020 is eligible to count towards the MS degree.

Petition Process

Petitions to the Graduate Studies Committee (GSC) may include program changes or transfers, course substitutions, and any other changes outside of the policies stated in the handbook. Petitions are considered by the GSC for approval or denial. Students are advised to discuss petitions with their academic advisors.

The petition process is as follows:

1. Student completes the GSC Petition form (https://forms.gle/yeqdeHvkWp5gLhRe8) and notifies their academic advisor of their submission no later than 5pm EST on the Friday before a GSC meeting.
2. Academic advisor presents the petition to the GSC.
3. Students are notified of the outcome of their petition via an email from their academic advisor after the GSC has met. Generally, all GSC decisions are final.
4. Due to time constraints, some petitions may be tabled until the following GSC meeting. If this occurs, students will be notified via email.
5. Academic advisor saves a finalized version of the petition.

Course Transfer Request Policy and Process

Only one graduate-level course, or the equivalent of 12 units, can be transferred from another university as credit toward the degree requirements of any of ECE's MS programs. As a guideline, 3-credit courses from other universities equate to 9-unit CMU courses; a 4-credit course equates to a 12-unit CMU course.

The course being transferred in must:

- Fulfill an ECE degree course requirement and be equivalent to a CMU course
- Be considered a graduate level course at the university where it was taken (unless requesting transfer credit for the one allowed undergraduate course)
- Have not been used to fulfill requirements for any previously earned degree

Please note that this policy is more restrictive than the CIT transfer credit policy (https://www.cit.cmu.edu/education/academic-policies/graduate-policies/registration-grading-credit.html#transfer-credit-&-special-students). The student must have earned a grade of 'B' or better for the course to be transferred. The transfer credits will appear on the student's transcript and will not be factored into the cumulative or program QPA.

Transfer credit is not granted prior to admission and must be approved by the Graduate Studies Committee and CIT Dean's Office. Courses can only be requested for transfer after the student has successfully completed 36 units of coursework at CMU. After matriculating to CMU, ECE students should consult with their academic advisor before taking a course at another university with the intention of transferring it to the ECE degree.

Transfer courses will be reviewed for academic rigor and alignment with courses offered in ECE. The course description and syllabus, learning outcomes, delivery mode, and institutional accreditation will be considered when evaluating the course for transfer.

The process for requesting to transfer a course is as follows:

1. Meet with academic advisor to discuss the course transfer.

2. Complete and collect the following mandatory documents:

    a. Official transcript from previous institution
    b. Detailed course description/syllabus (should include grading scale, assignments required, mandatory books, and time required in class) of the course the student wishes to transfer
    c. Letter from the previous institution's registrar or academic advisor stating the course intended for transfer was not used toward a completed degree
    d. Email endorsement from the instructor of the CMU course the student believes the desired transfer course is most equivalent to
    e. CIT Graduate Transfer Credit Request form: https://engineering.cmu.edu/_files/documents/graduate-students/grad_transfer_credit_request.pdf

3. Submit the completed packet to the academic advisor via the online petition form (https://forms.gle/yeqdeHvkWp5gLhRe8).

4. The academic advisor will share the petition with the ECE Graduate Studies Committee.

5. If the petition is approved, the academic advisor will work with the student to complete the transfer request.

6. The academic advisor will present the transfer request to the CIT Dean's office and notify the student of the result.

ECE has not entered into an articulation or transfer agreement with any specific college or university. The transfer of credits from any college or university must follow the above policy and process. Additionally, ECE does not award credit for prior experiential learning.

Research for Credit

MS ECE students matriculating spring 2020 and prior can apply up to 27 units of research credit towards their MS degree requirements by registering for the MS Graduate Project course.

MS ECE students matriculating fall 2020 and later, and who select the course option, may only count 12 units of MS Graduate Project toward the core Graduate Coursework requirement. Up to an additional 15 units of MS Graduate Project can be counted toward the CIT Elective requirement, for a maximum of 27 units of research credit.

MS ECE students matriculating fall 2020 and later, and who select the project option, will be required to complete 36 units of research credit.

MS SE students can apply up to 27 units of research credit towards their degree requirements.

MS AIE-ECE students may only count 12 units of MS Graduate Project toward the core Graduate Coursework requirement via a domain specific research project approved by the department. Up to an additional 15 units can be counted toward the CIT Elective requirement, for a maximum of 27 units of research credit.

The number of research units for which a student is registered should equate to the number of hours students will complete each week. For example, 12 units of research means the student should complete 12 hours of research each week. Alternative accommodations should be worked out with the supervising faculty member.

MS Research Approval Process:

- As a student in the ECE department, you are able to view and apply for available research projects electronically, through the Student Project Tracker (SPT) system (https://www.ece.cmu.edu/apps/spt/). New students gain access to the system by the first day of classes in their first term of enrollment.
- Students can view the details of available research projects and submit applications.
- Student applications will be reviewed by the research instructor(s) to whose projects the student applies. Applications may also be reviewed by third parties working with or who may be interested in working with students on research projects, or with the research instructor(s) on a research project. This may include third party industry or government collaborators or sponsors of research projects. Students will be contacted by the research instructor (or someone from the research instructor's lab) if there is interest in their application.
- The research instructor will inform the student's academic advisor through the SPT system if an application is approved, and the academic advisor will register the student for the appropriate research units. Students will be registered for 18-980/18-981/18-982 based on the units reflected in the SPT system.
- If a student has already made plans to work on a research project with a faculty member, the project still needs to be created in the SPT system. Students must apply and be accepted by the faculty through this system.
- If a student is planning on conducting research with a non-ECE faculty member, the project must still be posted in the SPT system. The student and/or the research instructor must find an ECE faculty member who is willing to be a co-instructor for the project.

Registering for Courses

Academic Calendar

The Academic Calendar can be found at https://www.cmu.edu/hub/calendar/ and provides information on all deadlines, including registration dates, class start dates, add/drop deadlines, exam dates, and more. ECE adheres to the official CMU academic calendar. The Heinz College and the Tepper School (https://www.cmu.edu/tepper/academic-calendar.html) follow their own calendars with dates that may differ from the University's calendar for the add, drop, and pass/no pass/audit deadlines. ECE students must adhere to the deadlines set by the unit offering the courses for which they are registered. Some ECE graduate classes are offered to students in CMU-

Africa and the United States with differing official holidays. These courses will prominently display exceptions to the official University calendar in the course schedule.

Stellic Degree Audit

Each student has access to the Stellic Degree Audit Application which includes degree planning tools that can show how courses, planned or scheduled, meet the degree requirements. Students can access Stellic through The Hub website at https://www.cmu.edu/es/stellic/index.html. Students should also meet with their academic advisor to review how their courses apply to the degree requirements.

Course Load

Due to the rigor of the ECE programs, students are advised to take 37 units of coursework in their first semester (36 units of coursework plus 18-989, Introduction to Graduate Studies) and 36 units of coursework each semester thereafter. However, the department recognizes that our student body is diverse, and that includes how each student handles their course load. While students may register for up to a maximum of 48 units each semester, we strongly recommend students take no more than 36 units each semester. Students unsure of whether they should take 48 units should schedule an appointment with their academic advisor to discuss their reasons for overloading and prepare a plan for handling the additional load.

IMB students in graduate status may request an overload if the four courses they opt to take exceed 48 units. In order for the overload to be considered, the following conditions must be met: 1) the overload request is only for four courses whose combined unit total exceeds 48, 2) as an undergraduate student, the IMB student overloaded in at least one semester and achieved a minimum QPA of 3.5 during that semester, and 3) the IMB student earned a minimum cumulative QPA of 3.75 in their undergraduate degree.

Adding Courses

Students can refer to the published Schedule of Classes for a list of classes being offered each semester. Students have the option to add courses to their schedule through SIO starting at their initial assigned registration time and ending at the add deadline. If a student wishes to be added to a course after the add deadline, the student must complete a Course Add Request Form (https://www.cmu.edu/hub/docs/late-add.pdf). If approved and signed by the course instructor, and providing that there is space in the desired course, the student must then submit the form to their academic advisor for approval. If approved, the academic advisor will send the form to the HUB for processing.

In the event that an ECE course (18-XXX) is crosslisted with a course from another department, ECE students must register for the ECE course number.

ECE students may be able to take courses in the Tepper School of Business and can register through Tepper's system, which is separate from SIO. Tepper publishes a list of available MBA courses for non-MBA students, and in order to register, students should visit the Tepper registration site: https://www.cmu.edu/tepper/programs/mba/curriculum/mba-course-requests/carnegie-mellon-graduate-students.html

Students taking undergraduate and master's level courses must follow the procedures and deadlines for adding, dropping, or withdrawing from courses as identified on the academic calendar. Information can be found at https://www.cmu.edu/hub/registrar/course-changes/index.html. There is a separate calendar for designated doctoral-level courses.

Course Locations

Courses will take place in various buildings and room locations across CMU campuses as assigned by the University Registrar's Office each academic semester. Some ECE courses are broadcast between different campus locations. Students may only register for courses offered in their program location as indicated in the official Schedule of Classes.

Dropping Courses

Students have the option of dropping courses from their schedule through SIO starting at their assigned registration time and ending at the drop deadline (see Academic Calendar). When a course is dropped before the drop deadline, it does not appear on the transcript. As a courtesy to others, students should drop a course as soon as they decide not to take it. This will likely allow another interested student to be enrolled and will limit disruptions to any team-based projects. If, as a result of dropping a course, a student drops below the 36 unit full time requirement, the student should discuss their overall plan with their academic advisor (see Full- and Part-time Requirements section).

Withdrawing from Courses

Students should remove themselves from a course they no longer wish to complete before the drop deadline each semester. If a student chooses to leave a course after the drop deadline, the student must officially withdraw from the course and should consult with their academic advisor to discuss the withdrawal. Withdrawals may take place after the drop deadline up through the course withdrawal deadline. Students must complete and submit the Course Withdrawal Request Form (https://www.cmu.edu/hub/docs/course-withdrawal.pdf) with their academic advisor in order to withdraw from a course. More information on withdrawal grades can be found on the CMU policy website under the grading policy (https://www.cmu.edu/policies/student-and-student-life/grading.html). Course withdrawals result in a "W" grade on the transcript, which is not factored into the QPA. However, withdrawn courses do count towards full-time status and the maximum 120 or 156 units and, if they are outside of the College of Engineering (CIT), towards the limited units students may take outside the College of Engineering (CIT).

Waitlists

It is typical for students to be on one or more waitlists at some point between the time of registration up until the add deadline. Waitlists may form for a variety of reasons, including as a common practice to ensure that students within a department have the opportunity to take the courses they need to graduate. To determine the likelihood of being registered from a waitlist for an ECE course, ECE students should email ece-waitlists@andrew.cmu.edu.

Once the semester begins, students may only attend courses for which they are registered, but may contact the instructor(s) of a course for which they are waitlisted to inquire about keeping

up with class material. Being waitlisted for a course is not a guarantee that a student will eventually be enrolled. Students may only be waitlisted for a maximum of 5 courses.

If a student clears a waitlist but registering for the course would create a scheduling and/or max unit conflict, then the student will receive a timed invitation via email to resolve the conflict(s) and enroll in the course. The invitation window shrinks as the Add Deadline approaches, to a minimum of 24 hours. It is very important for students to monitor their university email at all times during the registration period. If an invitation expires, the student will be removed from the waitlist, and their prior waitlist position cannot be restored. Invitation windows cannot be extended.

As a courtesy, students should remove themselves from the waitlist and/or drop a course in which they are no longer interested in a timely fashion, so as to allow other students the opportunity to be removed from the waitlist and enrolled in a course.

Students should check their schedules frequently on SIO as they may be enrolled from a waitlist without being notified. In addition, during the registration process, the Registrar's Office will require students to "tag up" on their waitlists in order to confirm the desire to remain on the waitlist for a course. Failure to confirm a waitlist will result in being dropped from the waitlist, and the previous waitlist position cannot be restored.

It is strongly recommended that students have a back-up plan in case they are not removed from a waitlist by the add deadline.

Course Delivery Modalities

Course delivery modalities refer to how a course is offered by the instructor (i.e., in-person, remote). CMU courses may utilize a variety of course delivery modalities, which are displayed in SIO, the Schedule of Classes, and Stellic for students. Students are expected to adhere to all listed delivery modalities for each course section. Further information about the possible delivery modalities can be found on the Enrollment Services website. International students should be mindful of visa implications that may accompany registering for courses with remote delivery modalities.

Courses with Time Conflicts

Students are generally not permitted to register for two courses whose scheduled meetings overlap, and will not be able to enroll in a course conflict in SIO. Registration may be possible with consent from both instructors, allowing the conflict and/or making suitable arrangements. Students must forward written permission from both instructors to their academic advisor in order to register for conflicting courses. If there is a pending invitation to enroll in a course from the waitlist, students must complete this process prior to the invitation expiration. Invitation windows cannot be extended.

Prerequisites

For graduate students, a course listed in SIO may have a published prerequisite which is strongly recommended as preparation for the course in question. All prerequisites will be listed and available for view in SIO.

While SIO allows graduate students to register for courses without the published prerequisite, it is the student's responsibility to confirm that they have adequate background knowledge to be successful in the subsequent course. This background knowledge may come in the form of a course taken at CMU or the student's undergraduate institution, or other work or research experience. Students should consult with the course instructor if they have any questions or concerns about their preparation.

For some ECE courses that require 18-613/18-213, the published prerequisite will be enforced for graduate students.

Antirequisites

An antirequisite is a course with content that is so similar to another existing CMU course that a student cannot receive credit for taking both.

For example, 15-513 (Introduction to Computer Systems) and 18-613 (Foundations of Computer Systems) are antirequisites. The content in these courses are so similar that the student would not gain sufficient new knowledge from taking both courses as to be worthy of receiving academic credit. As a result, a student may only receive credit towards their degree for taking one of them. All antirequisites are listed in SIO.

Corequisites

A corequisite is a course that must be taken at the same time as, or before, another course. All corequisites are listed in SIO.

Crosslisted Courses

A crosslisting involves two or more course numbers that are taught or co-taught by the same faculty, at the same time(s), and in the same room(s).

Crosslistings may occur between departments (such as an ECE course crosslisted with a course in the Computer Science department), or within the same department (such as an ECE undergraduate number crosslisted with an ECE graduate number), or both. ECE students are required to register for ECE course numbers, and ECE graduate students will have enrollment priority for ECE graduate course numbers. For ECE graduate course numbers crosslisted with ECE undergraduate course numbers, students enrolled in the graduate number will be expected to complete certain additional and/or more difficult requirements.

Selecting the appropriate section for crosslisted courses is imperative. Undergraduate course numbers (over 300-level) can only be counted as the one allowable undergraduate course toward the MS degree, and ECE graduate students will not receive enrollment priority in ECE undergraduate numbers, even if a crosslisting exists. Non-ECE course numbers do not count toward the ECE core degree requirement even if a crosslisting exists. Non-CIT course numbers count against the maximum allowable non-CIT coursework even if a crosslisting exists. The department(s) reserve the right to adjust a student's course registration as appropriate, which may include being removed from another department's course number and placed on the ECE waitlist.

Final Exams

All CMU students must attend final exams as scheduled by the university or individual course instructors. Each semester's final examination period will be published in the Academic Calendar every semester, and students are expected to avoid making end of term arrangements until the official final exam schedule is published for all courses. The ECE administration does not have control over the university's final examination period schedule. Please refer to Carnegie Mellon University Policies on Examinations and the university's Final Examination Conflict Guidelines for additional information.

Research Assistant & Teaching Assistant Positions

Research Assistant for Credit

See the Research for Credit section for more information about receiving academic credit for research.

Research Assistant for Pay

Students are permitted to pursue research opportunities for pay in any department. Students should contact faculty members individually to inquire about available opportunities and provide information on their background. The supervising faculty can provide further information about payroll procedures.

Teaching Assistant Assignments

Teaching Assistants are a vital part of successful ECE course delivery. All ECE students will receive an email each semester when applications open for the upcoming semester, typically around the date the Schedule of Classes is published. For complete information students can visit the Teaching Opportunities website: https://www.ece.cmu.edu/insider/teaching-opportunities.html. Students are encouraged to communicate with the faculty of any course(s) they are interested in supporting, who can discuss the course expectations and staffing needs. However, please note that the application and hiring process is entirely managed through ECE's online TAPS system: https://www.ece.cmu.edu/apps/taps/.

Teaching Assistant Training Workshops

https://www.ece.cmu.edu/insider/teaching-opportunities.html

ECE is committed to providing a high level of teaching excellence and ensuring a positive student learning experience. When serving as Teaching Assistants for ECE courses, students are extensions of the department charged with representing these values. Students are therefore required to complete training during the first semester in which they are hired to work as a TA. The TA training is not part of ECE degree requirements but is necessary to serve as an ECE TA. It is also separate from the language certification and language workshops offered by the Student Academic Success Center which may also be required. Once a student has fulfilled the training requirement, participation is not required again. If a student has served as a TA previously but has never completed the training, it will be required before beginning the next ECE assignment.

Hired Teaching Assistants will be contacted about the training requirements prior to the start of classes. Students are expected to plan their time accordingly.

Evaluation and Certification of English Fluency for Instructors

Graduate students are required to have a certain level of fluency in English before they can instruct in Pennsylvania, as required by the English Fluency in Higher Education Act of 1990. For more information about requirements, see Evaluation & Certification of English Fluency for Instructors in the University Policies of this handbook.

Enrollment Verifications

The Hub is the primary contact for students or alumni who would like to request a transcript, enrollment verification, or other information related to their time in ECE. Students can visit their website for more information: https://www.cmu.edu/hub/registrar/student-records/verifications/

ECE may verify some limited information in the form of a letter, which may be suitable for some purposes. Students should contact their academic advisor for more information. A common verification request, of skills students acquired through the ECE programs can only be performed by the Hub.

Leave of Absence

Occasionally, students must pause their degree program due to personal, professional, or academic reasons. A student who is considering a leave of absence should speak to their academic advisor prior to taking a leave of absence in order to ensure their understanding of the leave of absence policy and its ramifications.

Leaves of absence are capped at 2 calendar years total throughout the MS program. In extreme cases, a student may request additional leave time via a petition to the GSC.

If the student does not return within two academic years, they will be administratively withdrawn from the graduate program. IMB students who have declared the graduate degree but left CMU after completing their BS degree before having graduate status must also abide by this policy. Any student intending to return to the program outside of the 2-year leave (including CMU graduates with ECE BS degrees who have not declared for the IMB prior to graduation) must reapply to the graduate program. The University Process for taking a Leave of Absence can also be found at https://www.cmu.edu/hub/registrar/leaves-and-returns/index.html.

Once a student decides to take a leave of absence, they should complete the Leave of Absence form (https://www.cmu.edu/hub/docs/loa.pdf) and bring it to their academic advisor for additional processing. International students should consult with the Office of International Education (OIE) prior to taking a leave of absence from their program.

Returning from a Leave of Absence

A student intending to return from leave must submit the Petition to Return from Leave of Absence form (https://www.cmu.edu/hub/docs/return-loa.pdf) to their academic advisor at

least 30 days prior to the start of the semester in which they plan to return. A student's return must coincide with the start of a new semester (fall, spring, or summer). Students cannot return from a leave of absence mid-semester, with the exception of summers. International students who wish to return from leave in a summer term must be registered full-time for that summer term.

Per the university policy on student leaves: "Students on leave are not permitted to live in university housing, attend classes, or maintain employment as students at Carnegie Mellon while their leave is in effect" (https://www.cmu.edu/policies/student-and-student-life/student-leave.html).

 More information about the University's Leave of Absence and Withdrawal policies can be found here: https://www.cmu.edu/hub/registrar/leaves-and- withdrawals/.

Degree Certification Process & Commencement

A student must satisfy all degree requirements and achieve a minimum of 3.0 QPA in the courses applied towards the required 97 or 133 units (depending on program) to be eligible for degree certification. In addition, students must have provided a final copy of their undergraduate transcript(s) and must have a tuition balance of $0.00 to receive a diploma.

Once a student completes their degree requirements, their degree must be certified. Certification will occur regardless of whether or not a student has taken their maximum allowed units.

Carnegie Mellon University Commencement only occurs at the end of spring semester. ECE holds a diploma ceremony at the end of spring semester as well. Students who are certified in the summer or fall semesters are invited to attend the next commencement ceremony. Spring graduates are invited to the spring commencement ceremony.

Before graduation, students should update their contact information, such as mailing address and e-mail address, within SIO. Also, students should review a proxy of their diploma in SIO to verify the information displayed there, such as the spelling of their name.

Degree titles are listed above in the section titled Graduate Degrees and Programs Offered.

ACADEMIC STANDARDS

Grades

CIT Grading Policy

ECE follows the CIT letter grade scale. The letter grade scale is 'A' (highest for CIT students), 'A-', 'B+', 'B', 'B-', 'C+', 'C', 'C-', 'D+', 'D', and 'R' (lowest). CIT students cannot receive an 'A+' grade on their transcript, even if a course was taken from another college where 'A+' is given. Grades lower than 'C', meaning 'C-' or below, are considered failure in CIT and will not count toward degree requirements. For more information, please see CIT's website: https://engineering.cmu.edu/education/academic-policies/graduate-policies/registration-grading-credit.html

Incomplete Grade

Incomplete grades may be assigned at the discretion of the course instructor, per the university grading policy: https://www.cmu.edu/policies/student-and-student-life/grading.html. Students should expect to establish a mutually agreed-upon plan for the completion of the remaining coursework with the course instructor. Typically, incomplete grades will only be considered if 75% or more of the coursework has been completed to date, and has been of passing quality. Students must complete the required coursework no later than the end of the following academic semester, or sooner if required by prior agreement. Students who receive an 'I' (for 'Incomplete') grade will also be given a stated default grade. The default grade will be automatically posted to the transcript if the deadline to resolve the Incomplete grade passes without the student completing the agreed-upon work.

Withdrawal Grade/Withdrawing from Courses

Students can withdraw from a course after the drop deadline until the course withdrawal deadline. This will result in a 'W' on the transcript, which is not factored into the QPA. To withdraw, the course withdrawal request form (https://www.cmu.edu/hub/docs/course-withdrawal.pdf) must be completed and submitted to the academic advisor for approval. If approved, the academic advisor will send the form to the HUB for processing.

For the process for 'Withdrawal' from a program, students can visit: https://www.cmu.edu/hub/registrar/leaves-and-withdrawals/

Academic Performance

Quality Point Average

In order to graduate, each student must have a Quality Point Average (QPA) of at least 3.0 in the courses being used towards the required 97 or 133 units (depending on program). Coursework or graduate project units with a grade lower than 'C' will not be considered toward graduate degree requirements. However, they will be calculated into the student's cumulative QPA.

Quality Point Average (QPA) Calculations

Carnegie Mellon University defines a quality point as a point value times units for a given course. QPAs are calculated according to the following formula:

> **Semester QPA:** quality points divided by factorable units for a given semester
>
> **Cumulative QPA:** total quality points divided by total factorable units

See the CMU Grading Policies for grades not factorable into QPA. Courses taken while in undergraduate status are not factorable into the QPA for graduate students. A separate cumulative QPA is calculated for undergraduate and graduate records.

In order to graduate from the Department of Electrical & Computer Engineering, each student must have a **program QPA** of at least 3.0, defined as follows:

> **Program QPA:** quality points divided by factorable units in those courses being used towards the required units (97 or 133 units depending on program)

Coursework or graduate project units with a grade lower than 'C' will not be considered toward graduate degree requirements or factored into the program QPA. However, they will be factored into the student's cumulative QPA and total units.

Academic Probation

In the event that a student's semester QPA OR cumulative QPA falls below a 3.0, regardless of program QPA, that student will be placed on academic probation for the following term and will receive a Probation Letter from the department alerting them. While on probation, students must meet with their academic advisor and comply with their recommendations.

Based on the result of the probationary term:

- If semester QPA meets or exceeds 3.0 AND cumulative QPA meets or exceeds 3.0, the student has cleared probation.
- If semester QPA meets or exceeds 3.0 but cumulative QPA is below 3.0 for a second consecutive term, the student will be placed on Continuing Probation, regardless of program QPA, and will receive a Continuing Probation Letter.
- If semester QPA is below 3.0 for a second term, this is **grounds for dismissal,** regardless of program QPA. The student will receive a *Notice of Failure to Clear Probation, Academic Action Pending Lette*r after receipt of final grades and prior to the Probation Review, the date of which will be stated in the letter. Students wishing to remain in the master's program should meet with their advisor and must prepare a petition for consideration at the Probation Review, which the advisor will present on their behalf. Following the Probation Review, the student will receive a Dismissal Letter if dismissed, or a Continuing Probation Letter if allowed to remain in the program.

Continuing Probation is rare and students may wish to consider alternatives to continuing in the degree program. For any student on **Continuing Probation**, based on the result of the continued probationary term:

- If semester QPA meets or exceeds 3.0 AND cumulative QPA meets or exceeds 3.0, the student has cleared probation.
- If semester QPA is below 3.0 OR cumulative QPA is below 3.0 for a third consecutive term, this is **grounds for dismissal,** regardless of program QPA. The student will receive a *Notice of Failure to Clear Probation, Academic Action Pending Letter* after receipt of final grades and prior to the Probation Review, the date of which will be stated in the letter. The student has the opportunity to meet with their advisor and, if desired, present a petition for consideration at the Probation Review. Following the Probation Review, the student will receive a Dismissal Letter if dismissed, or a Continuing Probation Letter if allowed to remain in the program.

Probation and Continuing Probation statuses are internal and will not be listed on the official transcript. If a student is on Probation or Continuing Probation in their final academic term but achieves all graduation requirements in that term, the student will have earned their degree. They will not be subject to a Probation Review and will have their degree certified.

Students may appeal any/all Academic Action decisions as outlined in the Summary of Graduate Student Appeal and Grievance Procedures.

Academic Integrity

Please review the University Policy on Academic Integrity (https://www.cmu.edu/policies/student-and-student-life/academic-integrity.html). The policy includes the University expectations around academic integrity and provides definitions of cheating, plagiarism, and unauthorized assistance.

A review of the University's Academic Disciplinary Actions procedures (https://www.cmu.edu/student-affairs/theword/academic-discipline/index.html) is also recommended. These procedures outline the process for investigating, reporting, and adjudicating violations of the University Policy on Academic Integrity. The procedures also outline the appeal process.

Penalties for Violating Academic Integrity

Should an instructor believe that an academic integrity violation has occurred, they may consult with the Office of Community Standards & Integrity, who will assist the faculty member in handling a possible academic integrity violation and, if a student is found responsible for violating academic integrity policies, determining possible sanctions. In accordance with the university's policy, a student who violates the academic integrity policy will not be permitted to drop the course in which the offense occurred in order to avoid penalty. If the student attempts to drop the course, they will be reenrolled.

After a second academic integrity violation, the ECE Department will recommend to the Academic Review Board that you will be dismissed from ECE. For more information on the policies and procedures surrounding academic integrity, please see the website for the Office of Community Standards & Integrity.

Disciplinary Probation

Students who have committed an academic integrity violation are placed on disciplinary probation within the department for the remainder of their academic program. While on probation, students are allowed to continue with the program but must meet with their academic advisor.

MS DEGREE REQUIREMENTS

MS in Electrical & Computer Engineering

Spring 2020 and prior

This section outlines the degree requirements for all students who entered the Master of Science in Electrical & Computer Engineering program in Spring 2020 or prior in the Pittsburgh and CMU-Africa locations. ECE course list and course descriptions are available on the ECE course website: https://courses.ece.cmu.edu.

MS in Electrical & Computer Engineering

> ### *For students entering the program Fall 2018 or later:*
>
> Each MS ECE candidate must complete 97 units (1 unit = 1 hour of work) of coursework. All incoming MS ECE students must take the one-unit Introduction to Graduate Studies course (18-989) in their first semester. Please see the MS ECE Course Requirements page for more details on which students must take 18-989. The remaining 96 units will be comprised of the degree requirements below.
>
> ### *For students entering the program Spring 2018 or earlier:*
>
> Each student must complete 96 units (1 unit = 1 hour of work) of coursework, consisting of sections A and B below.

ECE Core Graduate Coursework: 60 units
The ECE program requires 60 units of core coursework that may not be waived or substituted. These courses should be in the ECE Department (18) at the 600-level or above. Additionally, courses in the Computer Science department (15), Machine Learning Department (10), and Robotics Institute (16) at the 600 level or above can be counted. For exceptions to the rule and pre-approved courses from other departments, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/course-requirements-prior-s2020.html

*Please note that only 12 units of MS Graduate Research Project (18-980) can be counted towards the Core Graduate Coursework requirement.

Electives: 36 units
Students have the opportunity to pursue a wide range of electives in which they have a special interest. Approved electives can be comprised of courses approved for core and those listed below.

Restricted Electives: 24 units
Restricted elective courses are courses which must be from approved departments and at the graduate level. For a list of approved departments and exceptions to the rule, please visit the MS ECE Course Requirements webpage referenced above.

*Please note that up to 15 units of MS Graduate Research (18-980/18-981) can be counted towards the Restricted Elective Coursework requirement.

Less-Restricted Elective: 12 units

Less-restricted elective courses are graduate or undergraduate level (must be xx-300 or greater) courses that may include courses from the same colleges, departments, and programs listed in the sections above. Less-restricted electives may count for up to 12 units of the 36 units of electives. Courses numbered as xx-299 or lower will not be counted toward the MS degree.

Three units of internship (18-994 Internship for Electrical and Computer Engineering Graduate Students) or professional development (39-699 CIT Professional Development Course) coursework may also count towards the Less-Restricted Elective.

Fall 2020 and later

This section outlines the degree requirements for all students who entered one of the four possible Master of Science in Electrical & Computer Engineering programs in Fall 2020 or later in Pittsburgh. A list of ECE courses and course descriptions are available on the ECE course website: https://courses.ece.cmu.edu.

MS in ECE - Standard

The M.S. in ECE standard program is a three-semester program that is comprised of 97 units of graduate course work (600 level and above). The Standard Program has two available options detailed below. The course option is available to students at both the Pittsburgh and Silicon Valley campuses. The project option is only available to students at the Pittsburgh campus.

Course option:

ECE Core Graduate Coursework: 60 units

The MS in ECE – Standard Program (course option) requires 60 units of core coursework that may not be waived or substituted. These courses must be in the ECE Department (18) at the 600-level or above. For exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Only 12 units of MS Graduate Research Project (18-980) can be counted towards the core Graduate Coursework requirement.

CIT Elective Courses: 24 units

The MS in ECE – Standard Program (course option) requires 24 units of CIT Elective coursework that may not be waived or substituted. These courses must be in the College of Engineering (CIT) at the 600-level or above. For a list of departments within CIT and for exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Three units of internship (18-994 Internship for Electrical and Computer Engineering Graduate Students) or professional development (39-699 CIT Professional Development Course) coursework may also count toward CIT Electives.

Up to 15 units of MS Graduate Research (18-980/18-981) can be counted towards the CIT Elective Coursework requirement.

General Technical Elective Courses: 12 units

The MS in ECE – Standard Program (course option) requires 12 units of General Technical Elective coursework that may not be waived or substituted. These courses must be at the 600-level or above from the departments listed above as well as many additional departments listed on the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Introduction to Graduate Studies (18-989): 1 unit

All incoming MS ECE students must take the one-unit Introduction to Graduate Studies course (18-989) in their first semester.

Preparatory Exception: Up to 12 units of undergraduate course work (300-level or higher) can qualify to be substituted toward the 96 units of core or elective requirements. Qualifying coursework must be offered by the same department as either an approved core or elective course.

Project option:

ECE Core Graduate Coursework: 36 units

The MS in ECE – Standard Program (project option) requires 36 units of core coursework that may not be waived or substituted. These courses must be in the ECE Department (18) at the 600-level or above. For exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

CIT Elective Courses: 12 units

The MS in ECE – Standard Program (project option) requires 12 units of CIT Elective coursework that may not be waived or substituted. These courses must be in the College of Engineering (CIT) at the 600-level or above. For a list of departments within CIT and for exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Three units of internship (18-994 Internship for Electrical and Computer Engineering Graduate Students) or professional development (39-699 CIT Professional Development Course) coursework may also count towards the CIT Elective.

General Technical Elective Courses: 12 units

The MS in ECE – Standard Program (project option) requires 12 units of General Technical Elective coursework that may not be waived or substituted. These courses must be at the 600-level or above from the departments listed above as well as many additional departments listed on the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

ECE Research Project: 36 units

The MS in ECE – Standard Program (project option) requires 36 units of the ECE Research project (18-980/18-982) that may not be waived or substituted.

Introduction to Graduate Studies (18-989): 1 unit
All incoming MS ECE students must take the one-unit Introduction to Graduate Studies course (18-989) in their first semester.

Preparatory Exception: Up to 12 units of undergraduate course work (300-level or higher) can qualify to be substituted toward the 96 units of core or elective requirements. Qualifying coursework must be offered by the same department as either an approved core or elective course.

*MS-AP in ECE – Applied Study**
The M.S.-AP in ECE is a three-semester program that is comprised of 97 units of graduate course work (600 level and above). The Applied Program has two available options detailed below. The course option is available to students at both the Pittsburgh and Silicon Valley campuses. The project option is only available to students at the Pittsburgh campus.

Course option:

ECE Core Graduate Coursework: 60 units
The MS-AP in ECE (course option) requires 60 units of core coursework that may not be waived or substituted. These courses must be in the ECE Department (18) at the 600-level or above. For exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Only 12 units of MS Graduate Research Project (18-980) can be counted towards the core Graduate Coursework requirement.

CIT Elective Courses: 24 units
The MS-AP in ECE (course option) requires 24 units of CIT Elective coursework that may not be waived or substituted. These courses must be in the College of Engineering (CIT) at the 600-level or above. For a list of departments within CIT and for exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Three units of professional development (39-699 CIT Professional Development Course) coursework may also count towards the CIT Elective.

Up to 15 units of MS Graduate Research (18-980/18-981) can be counted towards the CIT Elective Coursework requirement.

General Technical Elective Courses: 12 units
The MS-AP in ECE (course option) requires 12 units of General Technical Elective coursework that may not be waived or substituted. These courses must be at the 600-level or above from the departments listed above as well as many additional departments listed on the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

---

* Available to students matriculating Fall 2020 to Spring 2023.

Introduction to Graduate Studies (18-989): 1 unit
All incoming MS ECE students must take the one-unit Introduction to Graduate Studies course (18-989) in their first semester.

Required Summer Internship (18-993)
ECE students who are in the Applied or Applied Advanced Study Program are required to participate in a summer internship. This internship can be either on- or off-campus and does not need to be a paid position.

ECE will enroll all students who are pursuing the required internship for a 0-unit internship course (18-993 Internship for Electrical and Computer Engineering Graduate Students), which can be taken once throughout the student's MS ECE degree program of study and is offered only during the summer. This internship will appear on a student's transcript, though no tuition will be assessed. The work for the internship must be appropriate to the goals of the academic program.

Internships should be at least 20 hours per week and last for at least 10 weeks. Deviation from this internship length is possible with faculty approval. In any semester prior to the summer internship, students are required to complete the prerequisite course 39-699 (Career & Professional Development for Engineering Masters Students). This course will assist students with applying for and securing external internships. If an external internship cannot be secured by the student, ECE faculty advisors will assist in assigning a departmental internship project to meet this requirement.

You may not end your program on the summer internship. The required 0-unit internship must be taken before you meet the program's course unit requirements. For example, if you will complete all 97 units by Spring 2024, you cannot conduct your required internship during Summer 2024.

Preparatory Exception: Up to 12 units of undergraduate course work (300-level or higher) can qualify to be substituted toward the 96 units of core or elective requirements. Qualifying coursework must be offered by the same department as either an approved core or elective course.

Project option:

ECE Core Graduate Coursework: 36 units
The MS-AP in ECE (project option) requires 36 units of core coursework that may not be waived or substituted. These courses must be in the ECE Department (18) at the 600-level or above. For exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

CIT Elective Courses: 12 units
The MS-AP in ECE (project option) requires 12 units of CIT Elective coursework that may not be waived or substituted. These courses must be in the College of Engineering (CIT) at the 600-level or above. For a list of departments within CIT and for exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Three units of professional development (39-699 CIT Professional Development Course) coursework may also count towards CIT Electives.

General Technical Elective Courses: 12 units
The MS-AP in ECE (project option) requires 12 units of General Technical Elective coursework that may not be waived or substituted. These courses must be at the 600-level or above from the departments listed above as well as many additional departments listed on the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

ECE Research Project: 36 units
The MS-AP in ECE (project option) requires 36 units of the ECE Research project (18-980/18-982) that may not be waived or substituted.

Introduction to Graduate Studies (18-989): 1 unit
All incoming MS ECE students must take the one-unit Introduction to Graduate Studies course (18-989) in their first semester.

Required Summer Internship (18-993)
ECE students who are in the Applied or Applied Advanced Study Program are required to participate in a summer internship. This internship can be either on or off-campus and does not need to be a paid position.

ECE will enroll all students who are pursuing the required internship for a 0-unit internship course (18-993 Internship for Electrical and Computer Engineering Graduate Students), which can be taken once throughout the student's MS ECE degree program of study and is offered only during the summer. This internship will appear on a student's transcript, though no tuition will be assessed. The work for the internship must be appropriate to the goals of the academic program.

Preparatory Exception: Up to 12 units of undergraduate course work (300-level or higher) can qualify to be substituted toward the 96 units of core or elective requirements. Qualifying coursework must be offered by the same department as either an approved core or elective course.

MS-AD in ECE – Advanced Study
The M.S.-AD in ECE is a four-semester program that is comprised of 133 units of graduate course work (600 level and above). The Advanced Study Program has two available options detailed below. Both options are only currently offered to students who begin their studies at the Pittsburgh campus.

Course option:

ECE Core Graduate Coursework: 60 units
The MS-AD in ECE (course option) requires 60 units of core coursework that may not be waived or substituted. These courses must be in the ECE Department (18) at the 600-level or above. For exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Only 12 units of MS Graduate Research Project (18-980) can be counted towards the core Graduate Coursework requirement.

CIT Elective Courses: 36 units

The MS-AD in ECE (course option) requires 36 units of CIT Elective coursework that may not be waived or substituted. These courses must be in the College of Engineering (CIT) at the 600-level or above. For a list of departments within CIT and for exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Three units of internship (18-994 Internship for Electrical and Computer Engineering Graduate Students) or professional development (39-699 CIT Professional Development Course) coursework may also count toward CIT Electives.

Up to 15 units of MS Graduate Research (18-980/18-981) can be counted towards the CIT Elective Coursework requirement.

General Technical Elective Courses: 36 units

The MS-AD in ECE (course option) requires 36 units of General Technical Elective coursework that may not be waived or substituted. These courses must be at the 600-level or above from the departments listed above as well as many additional departments listed on the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Introduction to Graduate Studies (18-989): 1 unit

All incoming MS ECE students must take the one-unit Introduction to Graduate Studies course (18-989) in their first semester.

Preparatory Exception: 12 units of undergraduate course work (300 level and above) may be substituted as part of the 96 core and elective units.

Project option:

ECE Core Graduate Coursework: 48 units

The MS-AD in ECE (project option) requires 48 units of core coursework that may not be waived or substituted. These courses must be in the ECE Department (18) at the 600-level or above. For exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

CIT Elective Courses: 24 units

The MS-AD in ECE (project option) requires 24 units of CIT Elective coursework that may not be waived or substituted. These courses must be in the College of Engineering (CIT) at the 600-level or above. For a list of departments within CIT and for exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Three units of internship (18-994 Internship for Electrical and Computer Engineering Graduate Students) or professional development (39-699 CIT Professional Development Course) coursework may also count toward CIT Electives.

General Technical Elective Courses: 24 units

The MS-AD in ECE (project option) requires 24 units of General Technical Elective coursework that may not be waived or substituted. These courses must be at the 600-level or above from the

departments listed above as well as many additional departments listed on the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

ECE Research Project: 36 units
The MS-AD in ECE (project option) requires 36 units of the ECE Research project (18-980/18-982) that may not be waived or substituted.

Introduction to Graduate Studies (18-989): 1 unit
All incoming MS ECE students must take the one-unit Introduction to Graduate Studies course (18-989) in their first semester.

Preparatory Exception: Up to 12 units of undergraduate course work (300-level or higher) can qualify to be substituted toward the 96 units of core or elective requirements. Qualifying coursework must be offered by the same department as either an approved core or elective course.

MS-APD in ECE – Applied Advanced Study[*]
The M.S.-APD in ECE is a four-semester program that is comprised of 133 units of graduate course work (600 level and above). The Applied Advanced Study Program has two available options detailed below. Both options are only currently offered to students who begin their studies at the Pittsburgh campus.

Course option:

ECE Core Graduate Coursework: 60 units
The MS-APD in ECE (course option) requires 60 units of core coursework that may not be waived or substituted. These courses must be in the ECE Department (18) at the 600-level or above. For exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

*Please note that only 12 units of MS Graduate Research Project (18-980) can be counted towards the core Graduate Coursework requirement.

CIT Elective Courses: 36 units
The MS-APD in ECE (course option) requires 36 units of CIT Elective coursework that may not be waived or substituted. These courses must be in the College of Engineering (CIT) at the 600-level or above. For a list of departments within CIT and for exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Three units of professional development (39-699 CIT Professional Development Course) coursework may also count toward CIT Electives.

Up to 15 units of MS Graduate Research (18-980/18-981) can be counted towards the CIT Elective Coursework requirement.

---

[*] Available to students matriculating Fall 2020 to Spring 2023

General Technical Elective Courses: 36 units
The MS-APD in ECE (course option) requires 12 units of General Technical Elective coursework that may not be waived or substituted. These courses must be at the 600-level or above from the departments listed above as well as many additional departments listed on the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Introduction to Graduate Studies (18-989): 1 unit
All incoming MS ECE students must take the one-unit Introduction to Graduate Studies course (18-989) in their first semester.

Required Summer Internship (18-993)
ECE students who are in the Applied or Applied Advanced Study Program are required to participate in a summer internship. This internship can be either on or off-campus and does not need to be a paid position.

ECE will enroll all students who are pursuing the required internship for a 0-unit internship course (18-993 Internship for Electrical and Computer Engineering Graduate Students), which can be taken once throughout the student's MS ECE degree program of study and is offered only during the summer. This internship will appear on a student's transcript, though no tuition will be assessed. The work for the internship must be appropriate to the goals of the academic program. Internships should be at least 20 hours per week and last for at least 10 weeks. Deviation from this internship length is possible with faculty approval.

In any semester prior to the summer internship, students are required to complete the prerequisite course 39-699 (Career & Professional Development for Engineering Masters Students). This course will assist students with applying for and securing external internships. If an external internship cannot be secured by the student, ECE faculty advisors will assist in assigning a departmental internship project to meet this requirement.

You may not end your program on the summer internship. The required 0-unit internship must be taken before you meet the program's course unit requirements. For example, if you will complete all 133 units by Spring 2024, you cannot conduct your required internship during Summer 2024.

Preparatory Exception: Up to 12 units of undergraduate course work (300-level or higher) can qualify to be substituted toward the 96 units of core or elective requirements. Qualifying coursework must be offered by the same department as either an approved core or elective course.

Project option:

ECE Core Graduate Coursework: 48 units
The MS-APD in ECE (project option) requires 48 units of core coursework that may not be waived or substituted. These courses must be in the ECE Department (18) at the 600-level or above. For exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

CIT Elective Courses: 24 units

The MS-APD in ECE (project option) requires 24 units of CIT Elective coursework that may not be waived or substituted. These courses must be in the College of Engineering (CIT) at the 600-level or above. For a list of departments within CIT and for exceptions to the rule, please visit the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Three units of professional development (39-699 CIT Professional Development Course) coursework may also count toward CIT Electives.

General Technical Elective Courses: 24 units

The MS-APD in ECE (project option) requires 24 units of General Technical Elective coursework that may not be waived or substituted. These courses must be at the 600-level or above from the departments listed above as well as many additional departments listed on the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

ECE Research Project: 36 units

The MS-APD in ECE (project option) requires 36 units of the ECE Research project (18-980/18-982) that may not be waived or substituted.

Introduction to Graduate Studies (18-989): 1 unit

All incoming MS ECE students must take the one-unit Introduction to Graduate Studies course (18-989) in their first semester.

Required Summer Internship (18-993)

ECE students who are in the Applied or Applied Advanced Study Program are required to participate in a summer internship. This internship can be either on or off-campus and does not need to be a paid position.

ECE will enroll all students who are pursuing the required internship for a 0-unit internship course (18-993 Internship for Electrical and Computer Engineering Graduate Students), which can be taken once throughout the student's MS ECE degree program of study and is offered only during the summer. This internship will appear on a student's transcript, though no tuition will be assessed. The work for the internship must be appropriate to the goals of the academic program.

Preparatory Exception: Up to 12 units of undergraduate course work (300-level or higher) can qualify to be substituted toward the 96 units of core or elective requirements. Qualifying coursework must be offered by the same department as either an approved core or elective course.

MS in Artificial Intelligence Engineering – Electrical & Computer Engineering

The MS in AIE-ECE is a three-semester program that is comprised of 97 units of graduate course work (600 level and above). This degree program is only available to students at the Pittsburgh campus.

AIE Core Graduate Coursework: 42 units

The MS-AIE in ECE requires 42 units of core coursework taken from the College of Engineering approved Core. There are 4 parts to this core: **AI Systems**, satisfied using 18-763 — *Systems and*

Tool Chains for AI Engineering; **Machine Learning**, satisfied using 18-661 — *Introduction to Machine Learning for Engineers*; **AI Ethics**, satisfied using 24-784 — *Trustworthy and Ethical AI Engineering*; and **Deep Learning**, satisfied by any one of the following: 18-780 — *Introduction to Deep Learning Part 1*, 18-790 — *Introduction to Deep Learning and Pattern Recognition for Computer Vision Part 1*, 18-786 — *Introduction to Deep Learning*, or 18-794 — *Introduction to Deep Learning and Pattern Recognition for Computer Vision*. Substitutions and waivers for these core classes are not allowed. For details please visit the degree web page at https://www.ece.cmu.edu/academics/ms-ai.html.

ECE-AIE Domain Elective Graduate Coursework: 36 units

The ECE-AIE domains are partitioned into **Enablers**, **Producers** and **Consumers**. Students must take 36 units of Domain elective courses, such that 2 courses are taken from one area, and a third course is taken from one of the other areas. For the list of courses in each area please visit the degree web page at https://www.ece.cmu.edu/academics/ms-ai.html. If students use research for credit that is specific to one of these domains, they can request that up to 15 units of research be used to meet this requirement by discussing with their faculty advisor. This request should include a link to the SPT project that the student intends to use. Faculty advisors will usually review this together and will convey their decision to the student's primary advisor who will enroll them into one of 18-983, 18-984 or 18-985.

General Elective Graduate Coursework: 18 units

Students in the MS AIE-ECE program must take 18 units of general electives Students who take a 12 unit Deep Learning core class only need to take 12 units of General Electives. Students can sign up for research credit using SPT, and will be registered for 18-980. These 12 units can be satisfied by any 300-level or above from the departments listed on the MS ECE Course Requirements webpage: https://www.ece.cmu.edu/academics/ms-ece/standard-program.html

Introduction to Graduate Studies (18-989): 1 unit

All incoming ECE graduate students must take the one-unit Introduction to Graduate Studies course (18-989) in their first semester.

MS Concentrations

In addition to meeting the degree requirements, students may also declare a concentration. For more information about the available concentrations, see the section on MS Concentrations.

Integrated Master's/Bachelor's Program

As students who are in the IMB program are pursuing the same degree as those in our professional Master's program, they are required to adhere to the same requirements as other Professional MS students. This includes MS degree requirements, university policies, and CIT policies.

Course Restrictions

Courses in which more than 50% of the course grade is based on a group project or more than 20% is based on attendance cannot be used towards the required units for any MS program in

the department of Electrical and Computer Engineering. Mini courses worth 12 units cannot be used towards the required units. Students are responsible for checking the syllabi for classes to ensure their courses meet these requirements. For a complete list of all course restrictions, please visit our website: http://www.ece.cmu.edu/programs-admissions/masters/ms-requirements.html

For restrictions on the number of units taken outside of the College of Engineering, see the section on Maximum Units Allowed Outside CIT.

Internship Course Option

ECE students who are not in the Applied or Applied Advanced Study Program may wish to participate in optional paid internships at off-campus organizations during the summer months.

ECE will enroll all students who are pursuing an optional internship for a 3-unit credit bearing internship course (18994 - Internship for Electrical and Computer Engineering Graduate Students), which is graded as S/NP and available only during the summer. This internship will appear on a student's transcript and tuition will be charged for 3 units. Please see details for CIT cost of attendance on HUB's website. The work for the internship must be appropriate to the goals of the academic program and units can be applied to the less restricted elective requirement (for Spring 2020 students and prior) or the General Technical Elective requirement (for Fall 2020 students and later). The units earned are graded on the basis of a student written report. Guidelines for the report are shared with students using the 18994 Canvas page.

International students are required to consult with the Office of International Education for eligibility for work authorization before starting or seeking an internship/co-op or consulting opportunity. International students will benefit from proactively reviewing OIE guidance regarding off-campus work authorization. Off-campus work authorization processing times can take several weeks or months, and international students will benefit from starting the off-campus work authorization process as early as possible. Students are not eligible to use Curricular Practical Training authorization after they have completed all their degree requirements.

POST-MATRICULATION GUIDELINES

Return of University Property

ECE students must return all borrowed ECE and university materials—such as hardware, software, manuals, library books/materials, or any other Carnegie Mellon University property— prior to their departure from the program.

Career Services Employment Outcomes

ECE students are asked to complete and return a survey for Career Services updating CMU on their employment outcomes after graduation. Information about the survey is communicated in the students' final semester.

"Grandfather" Clause

When policies are changed, it is because the department believes the new rules offer an improvement; any such changes will be communicated to students. In case degree requirements are changed and certain courses are no longer offered, the department will try to find some compromise that allows those students to satisfy the original requirements.

TUITION AND FEES

As indicated in the admission offer letter, ECE does not offer financial assistance for master's students. Unless otherwise arranged and approved in advance, ECE students are full-time and will be charged full-time CIT tuition. Total charges for a period of attendance and an estimated schedule of total charges for an entire educational program can be found at the following website: https://www.cmu.edu/sfs/tuition/graduate/cit.html

Tuition Billing & Payments

The tuition rate for students entering ECE programs is set in the spring for the class entering in the following fall semester. Tuition for a student's second year will likely increase in accordance with any university tuition increase for a new academic year.

Students will be charged tuition per semester for each semester in which they are enrolled. Summer courses, if taken, are charged additional per unit tuition. The tuition billing and payment process for all ECE students is handled centrally by The HUB. For university billing and payment policies, please refer to The HUB's Billing and Payments website.

Part-Time Students

Part-time students will be charged tuition at the per unit rate. Arranging to pay per unit is a convenience and not intended to reduce the overall costs of the program. Students intending to be enrolled part-time should be certain their schedule reflects this by the tenth day of classes.

If a student is planning to pursue part-time coursework (< 36 units), in the event that the student registers full-time (> 35 units) at any point in that semester, they will be assessed the full-time tuition rate and no refund will be granted. Students pursuing part-time coursework should consult with their academic advisor before changing their course schedule.

Office of the Dean of Student Affairs Emergency Support Funding

Graduate students who find themselves in need of immediate funds for emergency situations should contact the Office of the Dean of Student Affairs (see Appendix A), https://www.cmu.edu/student-affairs/index.html, to inquire about the types of emergency funding available to enrolled students.

Student Financial Obligation

ECE students are subject to and must be aware of the Carnegie Mellon policy regarding student financial obligation.

CAREER SERVICES

The Career and Professional Development Services Center (CPDC) serves to provide students with guidance during their job and internship searches. The services available to students include resume reviews, mock interviewing, salary negotiation, career exploration consultation, internship and job consultation, workshops/events, and employer relations. The CPDC is also heavily involved in organizing campus-wide job fairs and bringing employers to campus.

Handshake is Carnegie Mellon's online recruiting system. Through Handshake, employers can request accounts to post jobs, request interviews and information sessions, and review student resumes. Students and alumni can apply to positions, sign up for interviews, and find contact information for thousands of recruiters. Handshake can be accessed through the CPDC website.

Career Consultants

ECE has an assigned career consultant who provides guidance through one-on-one appointments. Students in Pittsburgh can meet with Marcie Foy. Appointments with Marcie can be made through Handshake. She will also hold open office hours, which will be communicated at the beginning of each semester.

Job Search Guidelines

ECE strives to play a supportive role in the career pursuits of students, but maintains the priority of academics. It is not acceptable for students to skip classes or assignments in order to attend job interviews. Students should conduct job searches in a manner that does not impede the academic progress through their graduate program.

It is also important for students to understand how to conduct a job search. When applying for jobs, students are expected to exhibit certain ethical behavior, such as arriving on time for interviews, being truthful about their qualifications, and honoring their agreements with recruiters. Students should not continue looking and interviewing for positions after they have accepted an offer.

The CPDC reserves the right to limit access for any users who do not follow their ethical job/internship search policy. Students who do not follow such guidelines may forfeit their on-campus interviewing and/or resume submission privileges, as well as CPT and OPT approvals.

CMU First Destination Outcomes

Post-Graduation Salaries and Destination Information can be found at the following link:

https://www.cmu.edu/career/about-us/salaries-and-destinations/post-grad-dashboard.html

Employment with ECE Department

Eligible international students who qualify for pre- or post-completion Optional Practical Training (OPT) work authorization should note that the ECE department (as an employer) does not offer unpaid positions for OPT work authorization. While off-campus employment or volunteer opportunities under OPT work authorization do not have to be paid positions, ECE will only offer paid positions to eligible students.

Evaluation & Certification of English Fluency for Instructors

Graduate students are required to have a certain level of fluency in English before they can instruct in Pennsylvania, as required by the English Fluency in Higher Education Act of 1990. Through this Act, all institutions of higher education in the state are required to evaluate and certify the English fluency of all instructional personnel, including teaching assistants and interns. The full university policy can be reviewed at: https://www.cmu.edu/policies/faculty/evaluation-certification-english-fluency-instructors.html

The fluency of all instructional personnel will be rated by Language Support in the Student Academic Success Center to determine at what level of responsibility the student can TA. In addition to administering the International Teaching Assistant (ITA) Test (a mandatory screening test for any non-native speaker of English), Language Support in the Student Academic Success Center helps teaching assistants who are non-native English speakers develop fluency and cultural understanding to teach successfully at Carnegie Mellon. Visit the Student Academic Success Center website for additional information: www.cmu.edu/student-success

Retention of Student Records

Carnegie Mellon University has an official policy on the retention of student records.
Please visit this website for the University's policy: https://www.cmu.edu/es/docs/record-retention-policy.pdf

Suspension/Required Withdrawal Policy

University suspension is a forced, temporary leave from the university. A student may be suspended for academic, disciplinary, or administrative reasons. Additional information is available at the following link: http://www.cmu.edu/policies/student-and-student-life/suspension-required-withdrawal-policy.html

Withdrawal from Program

Students are able to withdraw from the department at any time. Prior to withdrawing, students should discuss their decision with their advisor(s). Students will be required to fill out the Withdrawal form located on The Hub website. International students must consult with OIE prior to filing a withdrawal form as there will be visa repercussions.

Verification of Employment

Carnegie Mellon University employees or former employees are required to use Employment Verification Request Form to request employment verification. Vendors, such as mortgage companies, may continue to use standard formats with a signed authorization. Details and forms are available at https://www.cmu.edu/hr/resources/hr-partners/hr-services/.

APPENDIX A

2024-2025
**Highlighted University Resources for Graduate Students
and
The WORD, Student Handbook**

Key Offices for Graduate Student Support

Office of Graduate and Postdoc Affairs
www.cmu.edu/graduate; grad-ed@cmu.edu
The Office of Graduate and Postdoctoral Affairs provides university-wide support for all graduate students and academic programs, with a focus on supporting graduate student success at Carnegie Mellon. Examples of resources offered through the Office of Graduate and Postdoctoral Affairs include, but are not limited to:

- Website with university resources, contact information for CMU programs and services, calendar of events related to graduate students
- Bi-monthly email to all graduate students with information on activities, resources, and opportunities
- Professional Development Seminars and Workshops
- GSA/Provost Conference Funding Grants
- GSA/Provost Small Research Grants (GuSH)
- Consultations on issues related to the graduate student experience

The Office of Graduate and Postdoctoral Affairs also works with the colleges and departments by informing and assisting in developing policy and procedures relevant to graduate students and working with departments on issues related to graduate students. Additionally, we partner with many other offices and organizations, such as the Graduate Student Assembly, to support the holistic graduate student educational experience.

Office of the Dean of Students
https://www.cmu.edu/student-affairs/dean
The Office of the Dean of Students provides central leadership of the metacurricular experience at Carnegie Mellon including the coordination of student support. Vice President of Student Affairs and Dean of Students Gina Casalegno leads the Division of Student Affairs which includes the offices and departments listed below (not an exhaustive list).

Graduate students will find the enrollment information for Domestic Partner Registration and Childbirth/Maternity Accommodations in the Office of the Dean of Students or on their website. This Office also manages the Student Emergency Support Funding process. There are three forms of support funding for enrolled students: emergency student loans, maternity loans, and the Tartan Emergency Support Fund. These funds are made available through generous gifts of alumni and friends of the university as well as support from student organizations,

Undergraduate Student Senate and the Graduate Student Assembly. Students will be provided with additional information about the various types of funding during a consultation meeting with a member of the Dean of Students team. Tuition costs are not eligible for Student Emergency Support Funding.

Additional resources for graduate students include College Liaisons and the Student Support Resources team. College Liaisons are senior members of the Division of Student Affairs who work with departments and colleges addressing student concerns across a wide range of issues. College Liaisons are identified on the student SIO page in the Important Contacts list. The Student Support Resources team offers an additional level of support for students who are navigating any of a wide range of life events. Student Support Resources staff members work in partnership with campus and community resources to provide coordination of care and support appropriate to each student's situation.

The Division of Student Affairs includes (not an exhaustive list):

- Athletics, Physical Education and Recreation
- Career and Professional Development Center (CPDC)
- Center for Student Diversity and Inclusion
- Cohon University Center
- Counseling & Psychological Services (CaPS)
- Dining Services
- Office of Community Standards and Integrity (OCSI)
- Office of Student Leadership, Involvement, and Civic Engagement (SLICE)
- University Health Services (UHS)
- Wellness Initiatives

Center for Student Diversity & Inclusion
https://www.cmu.edu/student-diversity/

Assistance for Individuals with Disabilities

http://www.cmu.edu/disability-resources/

The Office of Disability Resources at Carnegie Mellon University has a continued mission to provide physical, digital, and programmatic access to ensure that students with disabilities have equal access to their educational experience. We work to ensure that qualified individuals receive reasonable accommodations as guaranteed by the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act of 1973. Students who would like to receive accommodations can begin the process through Disability Resources' secure online portal or email access@andrew.cmu.edu to begin the interactive accommodation process.

Students with physical, sensory, cognitive, or emotional disabilities are encouraged to self-identify with the Office of Disability Resources and request needed accommodations. Any questions about the process can be directed to access@andrew.cmu.edu, or call (412) 268-

6121.

Eberly Center for Teaching Excellence & Educational Innovation
www.cmu.edu/teaching
We offer a wide variety of confidential, consultation services and professional development programs to support graduate students as teaching assistants or instructors of record during their time at Carnegie Mellon University and as future faculty members at other institutions. Regardless of one's current or future teaching context and duties, our goal is to disseminate evidence-based teaching strategies in ways that are accessible and actionable. Programs and services include campus-wide Graduate Student Instructor Orientation events and our Future Faculty Program, both of which are designed to help participants be effective and efficient in their teaching roles. The Eberly Center also assists departments in creating and conducting customized programs to meet the specific needs of their graduate student instructors. Specific information about Eberly Center support for graduate students is found at www.cmu.edu/teaching/graduatestudentsupport/index.html.

Graduate Student Assembly
 www.cmu.edu/stugov/gsa/index.html
The Graduate Student Assembly (GSA) is the branch of Carnegie Mellon Student Government that represents and advocates for the diverse interests of all graduate students at CMU. GSA is composed of representatives from the different graduate programs and departments who want to improve the graduate student experience at the different levels of the university. GSA is funded by the Student Activities Fee from all graduate students. GSA passes legislation, allocates student activities funding, advocates for legislative action locally and in Washington, D.C. on behalf of graduate student issues and needs, and otherwise acts on behalf of all graduate student interests. Our recent accomplishments are a testament to GSA making a difference. Steps to implementing the vision laid out by the strategic plan are laid out at the following link: https://www.cmu.edu/stugov/gsa/About-the-GSA/Strategic-Plan.html.

GSA offers an expanding suite of social programming on and off-campus to bring graduate students from different departments together and build a sense of community. GSA is the host of the Graduate Student Lounge on the 3rd floor of the Cohon University Center, which is a great place to study or meet up with friends. GSA also maintains a website of graduate student resources on and off-campus. Through GSA's continued funding for professional development and research conferences, the GSA/Provost Conference Funding Program and GSA/Provost GuSH Research Grants are able to run as managed by the Graduate Education Office. As we move forward, GSA will continue to rely on your feedback to improve the graduate student experience at CMU. Feel free to contact us at gsa@cmu.edu to get involved, stop by our office in the Cohon University Center Room 304, or become a representative for your department.

Office of International Education (OIE)
http://www.cmu.edu/oie/

Carnegie Mellon hosts international graduate and undergraduate students who come from more than 90 countries. The Office of International Education (OIE) is the liaison to the University for all non-immigrant students and scholars, as well the repository for study abroad opportunities and advisement. OIE provides many services including advising on personal, immigration, study abroad, academic, and social and acculturation issues; presenting programs of interest such as international career workshops, tax workshops, and cross-cultural and immigration workshops; international education and statistics on international students in the United States; posting pertinent information to students through email and the OIE website; and conducting orientation and pre-departure programs.

Veterans and Military Community
http://www.cmu.edu/veterans/
Military veterans are a vital part of the Carnegie Mellon University community. Graduate students can find information on applying for veteran education benefits, campus services, veteran's groups at CMU, and non-educational resources through the Veterans and Military Community website. There are also links and connections to veteran resources in the Pittsburgh community. The ROTC and Veteran Affairs Coordinator can be reached at uro-vaedbenefits@andrew.cmu.edu or 412-268-8747.

Carnegie Mellon Ethics Hotline
https://www.cmu.edu/hr/resources/ethics-hotline.html
The health, safety, and well-being of the university community are top priorities at Carnegie Mellon University. CMU provides a hotline that all members of the university community should use to confidentially report suspected unethical activity, violations of university policy, or violations of law. Topic areas for reporting may include, but are not limited to:

- Academic and Student Life
- Bias Reporting
- Discriminatory Harassment / Sexual Misconduct / Title IX
- Employee Misconduct
- Employment Related
- Environmental Health and Safety/Pandemic Safety
- Financial Matters
- Health and Wellness
- Information Systems and Data Privacy
- Public Safety & Criminal Activity
- Research & Intellectual Property

Students, faculty, and staff can anonymously file a report by calling 1-844-587-093 or visiting cmu.ethicspoint.com. All submissions are reported to appropriate university personnel and handled discreetly.

The hotline is NOT an emergency service. For emergencies, call University Police at 412-268-

2323.

Policy Against Retaliation

It is the policy of Carnegie Mellon University to protect from retaliation any individual who makes a good faith report of a suspected violation of any applicable law or regulation, university Policy or procedure, any contractual obligation of the university, and any report made pursuant to the Carnegie Mellon University Code of Business Ethics and Conduct.

Additional details regarding the Policy Against Retaliation are available at https://www.cmu.edu/policies/administrative-and-governance/whistleblower.html

Key Offices for Academic & Research Support

Computing and Information Resources
www.cmu.edu/computing
Computing Services maintains and supports computing resources for the campus community, including the campus wired and wireless networks, printing, computer labs, file storage, email and software catalog. As members of this community, we are all responsible for the security of these shared resources. Be sure to review the Safe Computing (https://www.cmu.edu/computing/safe/) section and the University Computing Policy (https://www.cmu.edu/policies/information-technology/computing.html)

Visit the Computing Services website (https://www.cmu.edu/computing/) to learn more. For assistance, the Computing Services Help Center is available at 412-268-4357 (HELP) or it-help@cmu.edu.

Student Academic Success Center
https://www.cmu.edu/student-success/
 Student Academic Support Programs

Communication and Language Support
Communication Support: The program offers free consultations for all CMU students on their written, oral, and visual projects. Our trained communication consultants help communicators convey ideas clearly and effectively on a variety of STEM and humanities topics. Consultants support communication excellence on essays, technical reports, oral presentations, slides, data visualization, advanced English language learning, and many other project types. Clients can bring in a project at any stage including brainstorming ideas, organizing thoughts, responding to instructor feedback, or putting finishing touches on the final draft.
Support is offered in several modes:
- *One-on-one communication tutoring* (in-person or Zoom synchronous meeting)--Clients meet with a consultant to improve the logic, clarity, and flow of writing or presentation and receive expert feedback that will strengthen a project. When making an

appointment, clients upload a draft, instructor prompts, and rubrics so consultants can use specific criteria to give relevant feedback. See the appointment types offered.

- *Video response* (asynchronous)--Clients upload documents in advance, then receive a 20-to 30-minute recorded video with a consultant's feedback. The feedback video will be received within 5 days after the scheduled appointment.
- *Group appointments*--Participate with your group to accomplish peer reviews or focus on collaborative presentation strategies.
- Workshops--Workshops are available on a variety of topics and help attendees learn research-backed communication strategies.
- Resources--An online collection of handouts and videos that concisely explain specific communication strategies is available.

Language and Cross-cultural Support

More than 60% of graduate students at Carnegie Mellon are international students, and others are nonnative speakers of English who have attended high school or undergraduate programs in the US. Many of these students want to hone their language and cross-cultural skills for academic and professional success. Students can make an appointment with a Language Development Specialist to get individualized coaching on language or cross-cultural issues. Students can choose from sessions on

- giving how to give a strong presentation,
- writing academic emails,
- analyzing expectations and strategies for clear academic writing,
- talking about oneself as a professional in the U.S.,
- developing clearer pronunciation,
- using accurate grammar,
- building fluency, and more.

Students can make an appointment with a Language Development Specialist to get individualized coaching on language or cross-cultural issues.

The Student Academic Success Center is also charged with certifying the language of International Teaching Assistants (ITAs), ensuring that nonnative English speakers have the language proficiency needed to succeed as teaching assistants in the Carnegie Mellon classroom.

Students preparing to do an ITA Certification should plan to take classes offered by the language support team at the SASC from the beginning of their first semester. Start by contacting the language support team at the SASC website or attend a Language Support Orientation at the SASC or in your department.

Learning Support

Academic Coaching: Academic Coaching provides holistic one-on-one peer support and group workshops to help students find and implement their conditions for success. We assist students in improving time management, productive habits, organization, stress management, and study skills. Students will request support through the Academic Success Center website and attend in-person meetings or meet using video and audio conferencing technology to provide all students

with support.

Peer Tutoring: Weekly Tutoring Appointments are offered in a one-on-one and small group format to students from any discipline who need assistance with a course that may not be supported by our other services. Weekly appointments give students the opportunity to interact regularly with the same tutor to facilitate deeper understanding of concepts. Students can register online through the Student Academic Success website.

"Just in Time" Workshops: The Student Academic Success team is available to partner with instructors and departments to identify skills or concepts that would benefit from supplemental offerings (workshops, boot camps) to support students' academic success and learning. We are eager to help convene and coordinate outside of the classroom skill-building opportunities that can be open to any student interested in building skill or reinforcing course concept mastery.

University Libraries
www.library.cmu.edu
The University Libraries offers a wide range of information resources and services supporting graduate students in course-work, research, teaching, and publishing. The library licenses and purchases books, journals, media, and other needed materials in various formats. Library liaisons, consultants, and information specialists provide in-depth and professional assistance and advice in all-things information including locating and obtaining specific resources, providing specialized research support, and advanced training in the use and management of data. Sign up for workshops and hands-on topic-specific sessions such as data visualization with Tableau, cleaning data with OpenRefine, and getting started with Zotero. Weekly drop-in hours for Digital Humanities and for Research Data Research Management are scheduled during the academic year. Start at the library home page to find the books, journals, and databases you need; to identify and reach out to the library liaison in your field; to sign up for scheduled workshops; and to connect with consultants in scholarly publishing, research data management, and digital humanities.

Research at CMU
www.cmu.edu/research/index.shtml
The primary purpose of research at the university is the advancement of knowledge in all fields in which the university is active. Research is regarded as one of the university's major contributions to society and as an essential element in education, particularly at the graduate level and in faculty development. Research activities are governed by several university policies. Guidance and more general information is found by visiting the Research at Carnegie Mellon website.

Office of Research Integrity & Compliance
www.cmu.edu/research-compliance/index.html
The Office of Research Integrity & Compliance (ORIC) is designed to support research at Carnegie Mellon University. The staff work with researchers to ensure research is conducted with integrity and in accordance with federal and Pennsylvania regulation. ORIC assists researchers with

human subject research, conflicts of interest, responsible conduct of research, export controls, and institutional animal care and use. ORIC also provides consultation, advice, and review of allegations of research misconduct.

Key Offices for Health, Wellness, and Safety

Counseling & Psychological Services
https://www.cmu.edu/counseling/
Counseling & Psychological Services (CaPS) affords the opportunity for students to talk privately about academic and personal concerns in a safe, confidential setting. An initial consultation at CaPS can help clarify the nature of the concern, provide immediate support, and explore further options if needed. These may include a referral for counseling within CaPS to another resource at Carnegie Mellon, or to another resource within the larger Pittsburgh community. CaPS also provides workshops and group sessions on mental health related topics specifically for graduate students on campus. CaPS services are provided at no cost. Appointments can be made in person or by telephone at 412-268-2922.

Health Services
www.cmu.edu/HealthServices/
University Health Services (UHS) is staffed by physicians, advanced practice clinicians, and registered nurses who provide general medical care, allergy injections, first aid, gynecological care, and contraception as well as on-site pharmaceuticals. The CMU Student Insurance Plan covers most visit fees to see the physicians and advanced practice clinicians and nurse visits. Fees for prescription medications, laboratory tests, diagnostic procedures, and referral to the emergency room or specialists are the student's responsibility and students should review the UHS website and their insurance plan for detailed information about the university health insurance requirement and fees.

UHS also has a registered dietician and health promotion specialists on staff to assist students in addressing nutrition, drug, and alcohol and other healthy lifestyle issues. In addition to providing direct health care, UHS administers the Student Health Insurance Program. The Student Health Insurance plan offers a high level of coverage in a wide network of health care providers and hospitals. Appointments can be made by visiting UHS's website, walk-in, or by telephone at 412-268-2157.

Campus Wellness
https://www.cmu.edu/wellness/
At Carnegie Mellon, we believe our individual and collective well-being is rooted in healthy connections to each other and to campus resources. The university provides a wide variety of wellness, mindfulness, and connectedness initiatives and resources designed to help students thrive inside and outside the classroom. The BeWell@CMU e-newsletter seeks to be a comprehensive resource for CMU regarding all wellness-inspired events, announcements, and professional and personal development opportunities. Sign up for the Be Well monthly

newsletter via https://bit.ly/BeWellNewsletter or by contacting the Program Director for Student Affairs Wellness Initiatives, at alusk@andrew.cmu.edu.

Religious and Spiritual Life Initiatives (RSLI)
www.cmu.edu/student-affairs/spirituality
Carnegie Mellon is committed to the holistic growth of our students, including creating opportunities for spiritual and religious practice and exploration. We have relationships with local houses of worship from various traditions and many of these groups are members of CMU's Council of Religious Advisors. We also offer programs and initiatives that cross traditional religious boundaries in order to increase knowledge of and appreciation for the full diversity of the worldview traditions. Our RSLI staff are here to support students across the spectrum of religious and spiritual practice and would be more than happy to help you make a connection into a community of faith during your time at CMU.

University Police
http://www.cmu.edu/police/
412-268-2323
The University Police Department is located at 4551 Filmore Street.   The department's services include police patrols and call response, criminal investigations, fixed officer and foot officer patrols, event security, and crime prevention and education programming as well as bicycle and laptop registration. Visit the department's website for additional information about the staff, emergency phone locations, crime prevention, lost and found, finger print services, and annual statistic reports.

Carnegie Mellon University publishes an annual campus security and fire safety report describing the university's security, alcohol and drug, sexual assault, and fire safety policies and containing statistics about the number and type of crimes committed on the campus and the number and cause of fires in campus residence facilities during the preceding three years. Graduate students can obtain a copy by contacting the University Police Department at 412-268-2323. The annual security and fire safety report is also available online at
https://www.cmu.edu/police/annualreports/.

Shuttle and Escort Services
Parking and Transportation coordinates the Shuttle Service and Escort Service provided for CMU students, faculty, and the community. The Shuttle & Escort website has full information about these services, stops, routes, tracking, and schedules.

The WORD
http://www.cmu.edu/student-affairs/theword//
The WORD is Carnegie Mellon University's student handbook and serves as the foundation for the department (and sometimes college) handbook. The WORD contains university-wide academic policy information and resources, community policies and resources, and describes the university level procedures used to review possible violations of these standards. It is

designed to provide all students with the tools, guidance, and insights to help you achieve your full potential as a member of the Carnegie Mellon community. Information about the following is included in The WORD (not an exhaustive list) and graduate students are encouraged to bookmark this site and refer to it often. University policies can also be found in full text at http://www.cmu.edu/policies/.

5000 Forbes Avenue

Pittsburgh, PA 15213

www.ece.cmu.edu
@CMU_ECE