# NEW YORK UNIVERSITY

# TANDON SCHOOL OF ENGINEERING

## Department of Electrical and Computer Engineering

# GRADUATE STUDENT MANUAL

This manual describes curriculum requirements for the graduate degrees offered by the department. It contains material not included in the School Bulletin, as well as corrections and updated modifications to the material in the Bulletin. The following graduate programs are offered by the department:

**Doctor of Philosophy**

Electrical Engineering (PhD/EE)

**Master of Science**

- Electrical Engineering (MS/EE)
- Computer Engineering (MS/CompE)

**Notes:**

There have been some changes in the curriculum requirement for the PhD/EE, MS/EE and MS/CE programs from the requirement described in the previous graduate manuals dated June 2017 and July 2020. These changes are effective for all current and new students. However, students have the option to follow the curriculum described on the NYU Tandon's Catalog and the ECE Graduate Student Manual at the time of their matriculation. Previous curriculum requirements can be found in the Graduate Student Manual published in earlier dates. Please contact the ECE Director of Graduate Program,Yong Liu, yongliu@nyu.edu, for details.

Since Fall 2018, all previously EL-prefixed graduate-level courses have been changed to ECE-GY xxxx, while all EE undergraduate courses are labeled ECE-UYxxxx.

[1]Last revised in January 2024.

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# I. DOCTORAL PROGRAM

## General

Graduate students who have exhibited a high degree of scholastic proficiency and have given evidence of ability for conducting independent research may consider extending their goals toward the doctorate. The Ph.D. degree is awarded after completing the program of study and research described below, and upon preparation and defense of a dissertation representing an original and significant contribution deemed worthy of publication in a recognized scientific or engineering journal.

## Admission to Program

Students entering the doctoral program with a Bachelor's degree must meet the entrance requirements for the Master's program in the appropriate area of concentration. Students entering at the Master's level for the Ph.D. in Electrical Engineering program are normally expected to have a Master's degree in Electrical Engineering or closely related areas. Generally, admission to these Ph.D. programs is conditional on a student achieving a 3.5 grade point average in prior BS and MS programs. Currently, GRE is optional for all Ph.D. applicants. International applicants must demonstrate excellent English language skills in reading, writing, speaking, and comprehension. Please See more detailed requirements on the school webpage.
https://engineering.nyu.edu/admissions/graduate/apply/requirements/english-language-proficiency-testing

## Thesis Advisor and Academic Advisor

Many factors enter into a student's choice of an advisor for his/her research. In addition to the scientific, intellectual and personality factors which influence the pairing of student and professor, financial aspects must also be considered. For most full-time students, the ideal situation is to find an advisor who has a research topic of mutual interest, as well as funds available from research grants and contracts which can support the student as a Research Assistant (RA). Fellowships are also available for new students, with recommendations from potential faculty advisors. A prospective student is encouraged to contact faculty members in his/her research area regarding the possibility of advising/fellowship/RA before applying to the Ph.D. program. A student who joins the Ph.D. program without securing a thesis advisor will be assigned an academic advisor, who will guide the student in terms of course selection and research activities before the qualifying exam. A Ph.D. student candidate must obtain the commitment of a faculty member in the student's chosen area of major research interest to be the student's thesis advisor before taking the qualifying exam.

Usually, the thesis advisor is a full-time faculty member in the Electrical and Computer Engineering Department and as such is considered chair of the student's Guidance Committee. If a student wishes to have someone outside the ECE department to serve as his/her advisor, the student should submit the CV of the person and a letter of commitment from the person to serve as the advisor to the Ph.D. EE Program Director for approval. The thesis advisor must have a Ph.D. degree in the student's proposed area of research.

## Qualifying Examination

A Ph.D. student (referred to as the student below) must pass the Ph.D. qualifying examination before the deadline to continue in the Ph.D. program and register for Ph.D. Dissertation Credits (ECE-GY 999x). The exam is an oral exam with content described below, but the student must have completed certain course and project requirements before taking the oral exam. Results of the exam will be recorded in the student's transcript as RE-GY 9990.

## A. Requirements to be satisfied before taking the oral exam

1) The student must have registered at NYU-Tandon for at least one semester and taken at least 3 graduate-level courses and the student's cumulative GPA from formal courses (not including MS thesis, independent projects and readings) should be 3.5 or above.
2) The student must have completed at least 2 core courses (See Section on Course Requirement), with GPA over the core courses being 3.5 or above, and each core course earning a grade of B or above.
3) The student must have completed a research project under the supervision of a project advisor. The advisor can be any faculty member associated with the ECE department. Notice that an external researcher may serve in this role, subject to approval by the chair of the ECE Graduate Academics Committee (to be referred to as the Graduate Committee subsequently). Examples of the project include, but are not limited to, an in-depth literature review of a certain topic, demonstrating solid understanding of a certain set of papers, or implementation and validation of some algorithms in past literature, or a study based on ideas initiated by the advisor or the student. Publication is not a requirement, but is encouraged if the student and the advisor find the contributions by the student worthy of publication. The project advisor should ensure that the project topic is appropriate for evaluating the student's potential for Ph.D. research. It is the student's responsibility to identify and secure a project advisor.
4) The student should have secured an ECE faculty member (or an external member approved by the Chair of the Graduate Committee) prior to taking the qualifying exam, who will serve as the student's Ph.D. advisor if the student passes the oral exam. The project advisor does not have to be the Ph.D. advisor. The prospective Ph.D. advisor is not obligated to provide financial support for the candidate. The advisor's letter of support must state a commitment of advising should the student pass the exam. It may also contain a narrative summarizing the student's progress in the program.

## B. Oral exam

1) The oral exam committee should include the prospective Ph.D. advisor, and three other faculty members chosen by the student in consultation with the Ph.D. advisor. The committee should have at least three Tandon ECE tenure or tenure track (T/TT) faculty (including advisor), the fourth one can be a faculty member or an industry/research professor (with Ph.D. in ECE. or a related area) from NYUAD, NYUSH, or any other NYU department. At most one member can attend the exam remotely if the member is at NYUAD or NYUSH. The student is responsible to secure the committee members to attend the oral exam and identify a time at which all committee members can attend. The exam should be scheduled for 1.5 hours to allow sufficient time for questions and answers and final discussion among the committee members. Once the schedule is fixed, the advisor should announce the exam to all ECE faculty and invite them to attend the exam.
2) A student must send in an official application, along with other required material, for taking the oral exam to the Ph.D. EE qualifying exam coordinator, at least two weeks before the target date of the oral exam. The application form can be downloaded from: http://engineering.nyu.edu/academics/departments/electrical/students/student-resources
3) The student must submit a written project report to the exam committee at least one week before the exam date. The written report should be self-contained, and follows the standard format of a conference paper. It is recommended that the report size is between 4 – 6 pages in double column, font size 11.
4) The student should prepare the report and the presentation independently, without the help from his/her advisor.
5) If a student wants to present a work described in a published, accepted or submitted paper of which the student is not the sole author, the student should submit a short report (2 pages) that is an

extensive summary of the work, or a literature survey of the area, and his/her future work, written by the student only, to be submitted along with the paper.

6) During the exam, the student should give a 30-minute project presentation, followed by questions from the committee members, which should cover both the topic areas of the project and the foundational knowledge in the student's chosen research area. Each committee member (excluding the advisor) is expected to engage in about 15 minutes of questions and answers with the student, with a total of 45 minutes for questions and answers. The student may ask each committee member about from which area the faculty member will ask fundamental questions, although the faculty member is not obliged to provide a detailed answer.
7) The committee will provide a written evaluation of the student's potential for Ph.D. research to the department. The committee members can seek input from the prospective Ph.D. advisor when making such an evaluation, but the advisor is excluded from participating in voting and writing the evaluation report. The evaluation criteria can be found from the evaluation form posted here: http://engineering.nyu.edu/academics/departments/electrical/student-resources
8) The ECE department will make the final decision of pass or fail based on the exam committee's recommendation. If the student and advisor's intent is to take the dissertation credits ECE-GY 999X during the same term as the qualifying exam, the exam committee's recommendation must reach the PhD qualifying exam coordinator at least a week in advance of the add/drop deadline for that term.
9) Result (Pass or fail) of the qualifying exam (RE-GY 9990) will be recorded in the student's transcript.
10) The student can present a work that has been presented at a conference, but the presentation should be modified as necessary to fit the qualifying exam oral presentation time limit and provide sufficient background material. The modification should be done by the student independently, without the help of the advisor.

**C. Time Limit and Timelines of the First and Repeat Oral Exams**

1) Qualifying Exam Limit: It is important to note that students must pass the qualifying exam within 2 full years of starting the PhD program or they can be dismissed from the PhD program. For a student who starts at a Fall semester, the two full years period finishes at the end of the second summer break; for a student who starts at a Spring semester, the two full years period finishes at the end of the second winter break. .
2) First Exam: For all students (both full-time and part-time), the first oral exam can be taken either in the first year or the second year but the max of 2 years to pass the qualifying exam still applies. If a student does not meet the requirement for taking the exam by this deadline, the student might be disqualified from the program.
3) Repeat Oral Exam and Disqualification: Students who failed the first oral exam but otherwise successfully meet the requirement for taking the oral exam can repeat the exam at most once, which should be completed within one year after the first exam. Students who fail to pass the repeat exam will be disqualified from the program.
4) Scheduling of First Exam and Repeat Exam: The first or repeat oral exam should be scheduled before a semester starts so that the student will be informed of the exam result on time for his or her course planning. *A student who needs to repeat the qualifying exam cannot repeat the exam in the same semester and must wait at least three months from the time when the first exam was taken*.
5) More on the Repeat Exam: When a student is found to be deficient only in one part of the exam (e.g. written report, presentation of the project, answering fundamental questions), the student may be asked to repeat just that part of the exam. The repeat of a portion of the exam is treated the same as the repeat of the qualifying exam and is subject to the same deadline.

**Course Requirements**

1) **Core Courses**: A student, in consultation with and upon approval by the Ph.D. advisor, should choose at least 4 ECE-GY courses (12 credits) among courses with numbers ECE-GY6xxx, ECE-GY7xxx, ECE-GY8xxx, or ROB-GY6003, ROB-GY6213, ROB-GY6323, ROB-GY6333, ROB-GY6423 as their core courses. Transferred courses cannot be used to satisfy the core course requirement. To graduate, each course must have a grade of B or above and the average grade of the four courses must be 3.5 or above. The student must have completed at least 2 such courses with the average grade of taken courses being 3.5 or above, before taking the oral qualifying exam. The remaining core courses must be completed before graduation. The list of core courses a student (with a prior MS degree) will register for must be approved by his or her Ph.D. advisor.
2) **ECE-GY courses:** A student must choose at least 24 credits of ECE-GY courses, including the core courses. This requirement can be satisfied by the 30 credits transferred from a prior MS degree in electrical engineering or computer engineering.
3) **ROB-GY courses**: The robotics courses ROB-GY6003, ROB-GY6213, ROB-GY6323, ROB-GY6333, ROB-GY6423 are considered as ECE-GY courses.
4) **Non-ECE Courses:** A student must choose at least 2 non-ECE graduate-level courses (6 credits or more) that are in either Science or Engineering discipline. These courses should be chosen from areas that are distinct and yet consonant with the student's research area. Please note the courses in management cannot be counted towards this requirement. Courses taken at other schools of NYU will be counted towards this requirement provided that the PhD advisor approves them. Transferred courses taken at other accredited graduate programs are subject to approval by the Ph.D. EE program director.
5) GA-GY 9993 – Ph.D. Writing Course: The GA-GY 9993: Writing and Communication for Engineers and Scientists is a three-credit course that can be taken by Ph.D. candidates (doctoral students who have passed their Ph.D. qualifying exam and are eligible to register for dissertation credits). To register for this course, students are required to obtain a permission number from the ECE graduate advisor. The course is offered with the grading basis of Satisfactory/Unsatisfactory. The ECE department counts GA-GY 9993 towards dissertation credits, and GA-GY 9993 will satisfy the requirement of registering for a minimum of 3 dissertation credits every fall and spring term, and will also count towards full-time equivalency status.
6) **Other courses:** The degree requires a total of 75 credits with at least 21 Ph.D. dissertation credits taken at Tandon. A student must take a minimum of 42 credits in formal courses (as distinct from "independent study" credits such as reading, project or thesis), with a minimum of 24 course credits in ECE-GY courses. The student has freedom in choosing courses, provided that he or she satisfies the requirements specified in 1), 2) and 3). The student should consult with his/her Ph.D. advisor or academic advisor in devising a course plan as early as possible so that the course work covers sufficient depth for the student's chosen area of research and related field, as well as sufficient breadth. Note that credits from CS5000-level courses cannot be counted towards Ph.D. EE degree.
7) **GPA requirement:** As with all the graduate programs at NYU-Tandon, a student must maintain a GPA of 3.0 or above among all courses taken at NYU. A student with a GPA below 3.0 has up to two semesters on probation. If at the end of the second semester on probation, the GPA is still below 3.0, the student will be disqualified from the program. The Ph.D. EE program further requires that a student must have a GPA of 3.5 or above among all formal courses (not including dissertation or other independent studies) taken at NYU to graduate, in addition to the GPA requirement for the core courses as specified in Item 1).
8) **Internships:** International students must register for an internship course to do an internship (with one exception stated below). Up to 6 credits of approved internships for Ph.D. (CP-GY 9941, CP-GY 9951, CP-GY 9961, CP-GY 9971, 1.5 credits each) can be applied towards the 75 credits Ph.D. degree requirement, and in particular, the ECE-GY course requirement as specified in Item 2) above. These credits can be part of the 45 credits beyond the 30 credits of a prior MS degree, which may include up to 3 credits of approved internships for MS (CP-GY 9911, CP-GY 9921). For an internship to be approved for credits, the internship must provide training relevant to the student's research area. All internships must

be approved and supervised by the student's Ph.D. advisor. The internship supervisor should submit a midterm and a final term evaluation report to the Ph.D. advisor. The student must submit a project report to the advisor upon completion of the internship for the evaluation and grading of the internship course. If the internship activity is necessary for a student's graduate level thesis or dissertation, and the experience and/or data from it will be directly and clearly used in the student's dissertation or thesis work, the student may submit an additional departmental letter, asking the OGS to approve CPT for thesis or dissertation without registering for an internship course. This exception only applies to students who have registered thesis credits before the internship starts. More detailed information about applying for CPT can be found on the following school webpage:
https://www.nyu.edu/students/student-information-and-resources/student-visa-and-immigration/current-students/employment-and-tax/curricular-practical-training.html

**Transfer Credits**

For Ph.D. students with a prior MS degree, they are allowed to transfer up to 36 credits, of which *30 credits must be from their prior MS degree in ECE or a closely related field*. For Ph.D. students admitted without a prior MS degree, they can transfer at most 6 credits. For the blanket transfer of 30 credits from a prior MS degree in ECE or a closely related field toward the PhD degree in EE, the student must provide a copy of his or her prior MS degree and the official academic transcripts. For individual course transfer, the student must provide an official transcript as well as catalog descriptions of the courses to be transferred, for evaluation and approval by the department graduate advisor. The official transcript and/or diploma submitted during the student's admission process can be used in place of new submission. Graduate courses taken at other schools of NYU or taken as an undergraduate student at NYU Tandon School of Engineering are exempt from this policy, but are subject to the general polity of the Tandon School of Engineering regarding such courses. This policy is effective for students entering in Spring 2018 and later.

**Guidance Committee**

On passing the qualifying examination, the student should consult with his or her thesis advisor to identify additional members and form a guidance committee. The committee should be composed of at least three members with the thesis advisor usually acting as Chairperson. If the dissertation advisor is not a tenured or tenure track (T/TT) Tandon faculty member of the Department, then a T/TT Tandon faculty member of the Department in the student's research area must be invited to serve as the Committee Chair. The committee should include at least two ECE T/TT faculty (including the advisor, and the NYUAD and NYUSH T/TT faculty), and may include at most two external members from outside the Department who are in the student's area of major research interest. The student must submit the names of the members of the Guidance Committee to the Office of Graduate Studies with a copy to the ECE Graduate Office *within 6 months of passing the qualifying exam*. The Guidance Committee conducts the area examination and thesis defense, and approves the final thesis. The Guidance Committee appointment form can be obtained from the Office of Graduate Studies.

**Area Examination**

In the area exam, the student reviews the prior research in the student's chosen dissertation topic and presents preliminary research results and additional research plan. The area exam is conducted by the Guidance Committee, but may be open to other interested faculty and students. The Guidance Committee attends and evaluates the student's performance and determines whether the student demonstrates the depth of knowledge and understanding necessary to carry out research in the chosen area. Results of the exam will be recorded in the student's transcript as ECE-GY 9980.

The student must submit a written report that summarizes prior research and the future plan at least one week before the scheduled exam time. The report should follow the Ph.D. dissertation template and be at least 25 pages long. The student must take and pass the area exam within 2 years after passing the Ph.D. qualifying exam. Students who fail to pass the exam by the deadline might be disqualified from the program.

The area exam evaluation form provides further details on the evaluation criterion for passing, and can be downloaded from: http://engineering.nyu.edu/academics/departments/electrical/student-resources

**Registration for Ph.D. Dissertation Credits**

After passing the qualifying exams, and with the agreement of the Thesis Advisor, the Ph.D. candidate may begin registration for dissertation credits ECE-GY 999x. (The student's failure to abide by this rule may result in loss of credit for the dissertation registration.) A student must register at least 3 credits for ECE-GY999x each semester. A minimum of 21 credits is required for the Ph.D. degree. The student must register for dissertation credits continuously, every Fall and Spring semester, unless a Leave of Absence has been granted by the Office of Graduate Studies.

**Maintenance of Study (MOS)**

After a student has completed all the required dissertation credits, the student can register for the zero-credit Maintenance of Study (MOS) to maintain full-time student status. If a student plans to graduate in any semester (including summer), the student must register for that semester; if the student has completed all the required credits, then the student should register for MOS in the final semester.

**Full-time Student Status**

Before passing the qualifying exam, a PhD student is required to register for at least 9 credits in Fall/Spring semester to maintain full-time student status. After passing the PhD qualifying exam, registering for a minimum of 3 dissertation credits is sufficient. As stated above, a student can also maintain full-time status by registering MOS (if qualified). If a student does not register for any credit in summer, to maintain the status as a containing student in the system, the student should either register for credits for the coming Fall semester before the summer starts, or register for zero-credit MOS in summer (if qualified).

**Submission of the Thesis and Thesis Defense**

Upon completion of the doctoral dissertation, the candidate undergoes an oral thesis defense. The defense is conducted by the Guidance Committee, but is open to all members of the ECE faculty and other invited people. *The student must submit a complete draft of the dissertation to the Guidance Committee members at least one week before the scheduled defense.* The student should consult the Office of Graduate Studies regarding how to submit, reproduce and bind the final manuscript.

**Seminar Attendance Requirement**

Ph.D. students are required to register for a 0-credit Research Seminar course (ECE-GY 9900) for at least 4 semesters. Satisfactory grade is given only if the student attends more than 2/3 of the seminars offered in a semester. Part-time students who have difficulty attending the seminar because of work conflict may be exempted from this requirement upon approval of the Ph.D. EE program director. The student should submit the approval note when applying for graduation.

**Publication Requirement**

To be granted the Ph.D. degree, a Ph.D. candidate must either have a peer-reviewed journal paper (accepted or published), or have at least one paper under review by a peer-reviewed journal on the thesis research subject.

For the journal paper(s), a letter of acceptance by a journal, or a letter of submission to a peer-reviewed journal along with acknowledgment of its receipt by the journal, will constitute the required evidence. If there is no accepted/published journal paper, the student should have at least one accepted conference paper that appeared in the proceedings of a peer-reviewed conference.

**PhD Time Limits**

The PhD time clock begins at the time of enrollment in the PhD program. Full-time PhD students who have completed an MS degree or who transfer 24 or more graduate credits towards their PhD degree must complete their PhD degree requirements within six years from the beginning of their PhD studies. Full-time PhD students who transfer in or have completed fewer than 24 credits when they begin their PhD studies have a maximum of seven years to complete their PhD. Part-time PhD students must complete their PhD degree requirements within nine years from the beginning of their PhD studies. Approved leave of absence will stop the time clock.

## II. MASTER DEGREE REQUIREMENTS

At least 30 credits are required for each MS degree. A grade point average (GPA) of 3.0 is required in all graduate courses taken at NYU-Tandon except those used for the undergraduate degree.

## 1. MASTER OF SCIENCE ELECTRICAL ENGINEERING (MS/EE)

### Entrance Requirements

Admission to the Master of Science in Electrical Engineering Program requires a Bachelor's in Electrical and/or Computer Engineering from an accredited institution, with a GPA of 3.0/4.0 or higher. The Graduate Record Exam (GRE) is required for all applicants. Students who do not have a prior BS degree in Electrical and/or Computer Engineering but have strong background in their chosen focus areas of study and sufficient mathematics preparation may be considered for admission.

### Course Requirements

To obtain the MS degree in Electrical Engineering, students must complete a total of 30 credits, with restrictions described below.

**Core Courses:** The core courses cover fundamental material and should be taken as early as possible. An advanced course subsequent to a core course may be taken in lieu of the core course, upon approval by the MSEE program advisor. All students must choose two out of the following core courses:

| | |
|---|---|
| ECE-GY 6113 | Digital Signal Processing I |
| ECE-GY 6253 | Linear Systems |
| ECE-GY 6303 | Probability and Stochastic Processes |
| ECE-GY 6713 | Electromagnetic Theory and Applications |
| ECE-GY 6403 | Fundamentals of Analog Integrated circuit design |

**Concentration areas:** Students are recommended to select courses to focus on one or two concentration areas, to obtain sufficient depth in the chosen areas. To provide flexibility for course selection based on the student's interests, a student does not need to officially declare a concentration, and no specific number of credits is required for each chosen concentration. For an up-to-date list of concentration areas and courses for each area, please visit: https://docs.google.com/document/d/1U88NjUOgBQA73aCZmqyY1D74tdfzqIZF/edit

**Thesis, project, and reading:** Students are encouraged to participate in research by registering for a master's thesis (ECE-GY997x, 6 credits, can be taken over two semesters), an advanced project (ECE-GY9953 or ECE-GY9963, 3 credits each, ECE-GY9941, 1.5 credits) or a reading course (ECE-GY9933, 3 credits). Students must secure a faculty member's commitment for advising such individual studies. Oral defense of the master's thesis with at least three professors (at least 2 ECE professors) in attendance is required. For the project and reading courses, a project report and an oral presentation is required. The total credits for thesis, projects, readings, and internships (see below) should not exceed 9 credits within the 30 credits required for the MS degree.

**Internships:** International students must register for an internship course (CP-GY 9911, CP-GY 9921, 1.5 credit each) to do an internship. Up to 3 credits of approved internships can be applied towards the 30 credits MS degree requirement. International students cannot do internships after they have completed the degree requirement. For an internship to be approved for credits, the internship job must provide industry and/or research experience relevant to the Electrical Engineering degree program. All internships must be approved and supervised by an ECE faculty member. Students must secure a faculty member's commitment for

advising an internship. The internship supervisor should submit a midterm and a final term evaluation report to the advisor. The student must submit a project report to the faculty advisor upon completion of the internship for the evaluation and grading of the internship course. The total credits for independent studies including MS thesis, projects, reading, and internship cannot exceed 9 credits within the 30 credits towards the MS degree. *Note that CP-GY 99x1 and CP-GY 99x2 can be counted towards the ECE-GY course requirement. However, if a student has already taken more than 7.5 credits of independent studies, he/she will not be approved for another CP course.*

**ROB-GY courses**: The robotics courses ROB-GY6003, ROB-GY6213, ROB-GY6323, ROB-GY6333, ROB-GY6423 are considered as ECE-GY courses.

**Out-of-department courses and 5000-level ECE-GY courses:** At least 24 credits should be ECE-prefixed courses. The other 6 credits can be from any science, engineering or management departments. A 3-credit course taken at other science or engineering departments of NYU that is closely related to electrical engineering may be used to substitute an ECE-GY course upon approval by the MSEE program advisor. The total number of credits for 5000-level ECE courses and non-ECE courses cannot exceed 12 credits. (Note that CS-GY 6133 Computer Architecture I taken before Fall 17 will be counted as ECE-GY credits for this purpose.) Credits from 5000-level courses from other departments cannot be counted towards MS/EE degree, except with approval by the Program Director.

**Note about CS-GY 6843 Computer Networking:** We expect most students have covered this material in an undergraduate course. Therefore, students can only take this course for credits towards MSEE degree in exceptional cases and only if approved by Professor Yong Liu.

**Transfer Credits:** No transfer credits are accepted towards the MS degree.

**GPA requirements:** An overall GPA of 3.0 or above in all graduate courses taken at NYU is required.
In addition, an average of 3.0 is required among the two core courses.

## 2. MASTER OF SCIENCE COMPUTER ENGINEERING (MS/CompE)

### Entrance Requirements

Admission to the MS program requires a bachelor's degree in computer engineering, electrical engineering or computer science from an accredited institution. Students without such prior degrees must complete appropriate undergraduate courses to remove any deficiencies in preparation. Topics in which deficiencies must be removed include logic circuits design, state analysis and synthesis techniques, computer architecture, data structures and algorithms and C or C++ programming. The Graduate Record Exam (GRE) is required for all applicants.

### Course Requirements

To obtain the MS degree in Computer Engineering, students must complete a total of 30 credits, with restrictions described below.

**Core Courses (6 credits):**
The core courses cover fundamental material and should be taken as early as possible. An advanced course subsequent to a core course may be taken in lieu of the core course, upon approval by the graduate director . All students must choose two out of the following core courses:

- ECE-GY 6913 Computing Systems Architecture
- ECE-GY 6463 Advanced Hardware Design
- ECE-GY 6473 Introduction to VLSI System Design

- ECE-GY 6483 Real Time Embedded Systems
- ECE-GY 5373 Internet Architecture & Protocols Lab

*(Note that ECE-GY 6913 is a newly developed course that replaces CS-GY 6133 Computer Architecture I as a core course. ECE students interested in computer architecture should take this course instead of CS-GY 6133. CS-GY 6133 will be approved as a core course for MS-CE only if it was taken prior to Fall 17.*)

**Electives (24 credits):**
At least 24 out of 30 credits should be ECE-GY prefixed courses including the core courses. Up to two non-ECE courses (equivalent to six credits) can be taken from other science, engineering, or management departments at NYU. The total number of credits for 5000-level ECE courses and non-ECE courses cannot exceed 12 credits. *Note that CP99x1 and CP99x2 can be counted towards the ECE GY course requirement.* Furthermore, credits from 5000-level courses from other departments cannot be counted towards MS/CE degree, except with approval by the graduate director.

**ROB-GY courses**: The robotics courses ROB-GY6003, ROB-GY6213, ROB-GY6323, ROB-GY6333, ROB-GY6423 are considered as ECE-GY courses.

**Project requirement (3 credits):**
One 3-credit advanced project in ECE/CSE (ECE-GY9953 or CS-GY9963) is required. Certain courses with significant project components may be used to partially satisfy the project requirement, subject to approval by the program director.

**Note about CS-GY 6843 Computer Networking:** We expect most students have covered this material in an undergraduate course. Therefore students can only take this course in exceptional cases and only if approved by Professor Yong Liu.

**Thesis, project, and reading:** See the section titled "Thesis, project, and reading" for MS/EE.

**Internships:** See the section about internship for MS/EE.

**Transfer Credits:** No transfer credits are accepted towards the MS degree.

**GPA requirements:** An overall GPA of 3.0 or above in all graduate courses taken at NYU is required. In addition, an average of 3.0 is required among the two core courses.

## III. FINANCIAL AID AND SCHOLARSHIPS

## Support Available for Ph.D. Students

**Fellowships through School of Engineering**
Offered to new applicants for Ph.D. in Electrical Engineering programs with exceptional qualifications. The fellowships in general cover stipend, full tuition and fees, and provide start-up funds. Students receiving fellowships are expected to be supported by Research Assistantships offered by their advisors after the fellowships end, provided they maintain high academic standards.

**Scholarship from Center for Cybersecurity**
The Center for Cybersecurity fosters the next generation of scholars by proudly hosting the ASPIRE scholarship, the NYU Cyber Scholars Program, and the Latham & Watkins Award in Technology and Law, along with scholarships and fellowships for PhD applicants in Cybersecurity. For more information, please visit: http://cyber.nyu.edu/student-scholarships/

**NYUAD Global Ph.D. Student Fellowship:**
The fellowship covers tuition, fees, health insurance, competitive salary, and allowances for 4 years. Fellowship recipients are advised by an NYUAD standing faculty member, and conduct their doctoral research at NYUAD. Fellowship candidates are required to hold a relevant master's degree in order to be considered for the fellowship. For more information, please visit the NYUAD Global Ph.D. Student Fellowship page here: http://nyuad.nyu.edu/en/academics/graduate-programs/engineering.html

**RESEARCH ASSISTANTSHIP**

Students receiving this award are expected to perform research work supervised by a faculty advisor. The applicant must be a full-time PhD candidate. The compensation for the research assistants includes a stipend in addition to tuition remission. This award is given to new and current PhD students with excellent academic credentials.

**Course Assistant**

The ECE department hires qualified graduate students as Course Assistants for course related duties such as homework grading, assisting graduate and undergraduate lab sessions, and office hours. These positions are open only for current students who have excellent academic records and demonstrated good teaching skills. Openings for these positions vary from semester to semester. Interested students should contact the faculty in charge of the relevant courses directly.

## Support Available for MS Students

**Merit Scholarship**

The Merit scholarships are offered to qualifying applicants to Master's degree, in the form of tuition discount. For more information, please visit: https://engineering.nyu.edu/admissions/graduate/tuition-and-financial-aid

## IV. AWARDS FOR ECE GRADUATE STUDENTS

The ECE Department offers the following annual awards for ECE Graduate Students at the end of Spring semester. The winners will be selected from students nominated by ECE faculty members. Specific information about nomination and evaluation will be announced around early April in each year.

**The Alexander Hessel Award for the Best Ph.D. Dissertation in Electrical Engineering**

This award is given in memory of the late ECE Professor Alexander Hessel to a graduate student for the most outstanding doctoral dissertation in electrical engineering. The award carries a cash prize of $1500. All Ph.D. students who completed a doctoral dissertation (or a complete draft) between April of the previous year and March of the current year are eligible.

**The Dante Youla Award for Graduate Research Excellence in Electrical Engineering**

This award is given in memory of the late ECE Professor Emeritus Dante Youla for timely recognition of important research contributions made by Ph.D. students. The award recognizes one impactful paper in which the awardee is the principal author or a significant external award. The paper needs to be published/accepted or the external award received in the past year (between April of the previous year and March of the current year). The award carries a cash prize of $500.

**The David Goodman Leadership and Academic Excellence Award**

This award is given in honor of ECE Professor Emeritus David Goodman to one or more Ph.D. students who have demonstrated excellence in leadership and service while maintaining outstanding research and academic performance. This award recognizes both internal and external leadership and service to the profession. All PhD students are eligible. The award carries a cash prize of $500.

**The Theodor Tamir Award for the Best MS Thesis in Electrical and Computer Engineering**

Established by the late ECE Professor Emeritus Theodor Tamir, this award is given to a student in the MS program for the most outstanding MS Thesis or research project (with detailed report or published/accepted papers) in electrical or computer engineering. All MS students who completed a MS Thesis (or a complete draft) or a research project the past year (between April of the previous year and March of the current year) are eligible. The award carries a cash prize of $500.

**The Myron M. Rosenthal Award for Best MS Academic Achievement in Electrical and Computer Engineering**

This award is given to MS students in electrical or computer engineering who have achieved excellent academic performance. All MS students who graduated or expect to graduate between June of the previous year and May of the current year are eligible. This award carries a cash prize of $200.

**The David C. and Cecilia M. Chang Education Award for Graduate Teaching Excellence in Electrical and Computer Engineering**

Established and funded by the former President of Polytechnic University David C. Chang and his wife Cecilia M. Chang, this award is given to one or more ECE graduate students who have demonstrated

excellence in assisting undergraduate or graduate classes in the past year (Spring and Fall semesters of the previous year). The award carries a cash prize of $500.

## V. ECE GRADUATE COURSE LISTING and FACULTY ROSTER

Catalog listing of all ECE Graduate Courses and important Guidelines and Policies, including applying for graduation and taking classes at NYU, can be found at:

http://bulletin.engineering.nyu.edu/

The list of ECE faculty can be found at:

https://engineering.nyu.edu/academics/departments/electrical-and-computer-engineering/people