

Graduate Program Guide

Department of Electrical and Computer Engineering | Northeastern University |
Academic Year 2026–2027 — Boston Campus

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List of Acronyms

Acronym	Meaning
CCSP	Communications, Control, and Signal Processing
COE	College of Engineering
CSYS	Computer Systems and Software
CVLA	Computer Vision, Machine Learning, and Algorithms
ECE	Electrical and Computer Engineering
ELPO	Electromagnetics, Plasma, and Optics
FT	Full-time
GAC	Graduate Affairs Committee
GL	Gordon Leadership
GSE	Graduate School of Engineering
HSMI	Hardware and Software for Machine Intelligence
IIRR	Individual Instruction Registration Request
INSI	Intelligent Networked Systems Institute
IP	In Progress
MGEN	Multidisciplinary Graduate Engineering
MSC	MSECE, course-only track
MSECE	Master of Science in Electrical and Computer Engineering
MSECE+LC	MSECE with Leadership Certificate
MSAI	Master of Science in Artificial Intelligence
MSIoT	Master of Science in Internet of Things
MSMD	Microsystems, Materials, and Devices
MSSCEN	Master of Science in Semiconductor Engineering
MST	MSECE, course-thesis track
MSWiNE	Master of Science in Wireless and Network Engineering
NU	Northeastern University
NUID	Northeastern University Identification Number
OGS	Office of Global Services
PhD-BE	PhD, BS Entry
PhD-AE	PhD, Advanced Entry
PhDCE	PhD in Computer Engineering
PhDEE	PhD in Electrical Engineering
POWER	Power Systems, Power Electronics, and Motion Control
PT	Part-time

Acronym	Meaning
QE	Qualifying Exam
RA	Research Assistant(ship)
ROR	Registration Override Request
SH	Semester Hour
S/U	Satisfactory or Unsatisfactory
TA	Teaching Assistant(ship)

1. General Information

This document provides information about ECE graduate programs at Northeastern University. Graduate students are expected to read it, be familiar with its rules and procedures, follow them, and consult it whenever questions arise.

1.1. Graduate Programs and Degrees

The ECE Department offers three graduate programs:

- Master of Science in Electrical and Computer Engineering (MSECE)
- PhD in Electrical Engineering (PhDEE)
- PhD in Computer Engineering (PhDCE)

In partnership with the [Gordon Institute of Engineering Leadership](#), we also offer:

- MSECE with Leadership Certificate (MSECE+LC)

With the [Intelligent Networked Systems Institute \(INSI\)](#), we co-offer two MS programs:

- Master of Science in Wireless and Network Engineering (MSWiNE), with INSI
- Master of Science in Internet of Things (MSIoT), with INSI and the [Khoury College of Computer Sciences](#)

We also participate in joint MS programs led by other departments:

- Master of Science in Artificial Intelligence (MSAI), with [Khoury College of Computer Sciences](#)
- Master of Science in Data Science (MSDS), with [Khoury College of Computer Sciences](#)
- Master of Science in Robotics (MSROB), with the Mechanical and Industrial Engineering Department ([MIE](#)), [Khoury College of Computer Sciences](#), and the [Institute for Experiential Robotics \(IER\)](#)
- Master of Science in Semiconductor Engineering (MSSCEN), with MIE
- Master of Science in Extended Reality (MSXR), with Khoury College, D'Amore-McKim, Bouvé College, the College of Social Sciences and Humanities, and the College of Art, Media and Design

All MS programs can be pursued full-time (FT) or part-time (PT). Applicants with a BS or MS in electrical and computer engineering, or a closely related field, may apply to any MS program or either PhD program — an MS degree is not required for PhD admission. Both PhD programs are full-time; PhD students must register every Fall, Spring, and Summer Full semester.

1.2. Graduate Advising

PhD students are advised by their research advisor. For questions about rules and regulations, contact COE PhD Grad Advising (coe-phd-gradadvising@northeastern.edu).

MSC and MST students who do not yet have a research advisor are advised by Graduate Student Services; contact COE ECE Grad Advising at coe-ece-gradadvising@northeastern.edu. MST students with a research advisor are academically advised by that advisor, who may be any tenured, tenure-track, affiliated, teaching, or research ECE faculty member. MST students may switch to MSC after completing one semester in the department and must switch to MSC if they still lack a thesis advisor after two semesters.

A PhD advisor (or lead advisor, in joint-advising cases) may be any tenured, tenure-track, or affiliated ECE faculty member. All PhD students have a research advisor from the start of the program.

2. The MSECE Program

MSECE graduates gain the analytical and technical knowledge, tools, and skills to address advanced engineering problems in their field by completing fundamental courses, concentration courses in their chosen concentration, and — for the thesis track — a project or thesis. Graduates are able to analyze problems and formulate and design solutions within their concentration, using analytical, numerical, and experimental techniques.

2.1. MSECE Tracks

Applicants choose one of two tracks at admission: the course-thesis track (MST) or the course-only track (MSC). Track changes are possible after one semester in the original track; see Section 21 for details, conditions, and requirements.

2.2. MSECE Concentrations

Applicants choose one of the seven concentrations below at admission:

1. Communications, Control, and Signal Processing (CCSP)
2. Computer Systems and Software (CSYS)
3. Computer Vision, Machine Learning, and Algorithms (CVLA)
4. Electromagnetics, Plasma, and Optics (ELPO)
5. Hardware and Software for Machine Intelligence (HSMI)
6. Microsystems, Materials, and Devices (MSMD)
7. Power Systems, Power Electronics, and Motion Control (POWR)

A concentration change is possible after a student's semester in the ECE Department, by filing a petition. See Sections 18 and 22 for details.

2.3. Description of MSECE Concentrations

Communications, Control, and Signal Processing (CCSP)

This concentration develops deterministic and stochastic methods and algorithms for modeling, analyzing, and designing communications, control, and signal-processing systems. Areas of research strength include underwater communications and robotics; wireless communication, coding, and information theory; biomedical and statistical/adaptive signal processing; brain–computer interfaces; pattern recognition; robust, adaptive, and distributed control; image and video processing; mobile and assistive robotics; and detection, estimation, localization, and object tracking. Graduates pursue careers in wireless and mobile communications, and in applying signal- and image-processing techniques to communications, control, imaging, radar, sonar, and robust/adaptive control system design.

Computer Systems and Software (CSYS)

This concentration prepares students for careers in microprocessor design and verification, embedded hardware and software development, performance analysis and modeling, advanced computer system design, and operating system design. Coursework covers computer architecture, simulation and performance evaluation, VLSI design, fault-tolerant computing, operating systems, and embedded design. Students learn to design and implement hardware and software systems — microprocessors, graphics processors, high-performance computing, CAD tools, CMOS design rules, compilers, computer arithmetic, resilient computation, advanced logic design, and hardware/software co-design.

Computer Vision, Machine Learning, and Algorithms (CVLA)

This concentration prepares students for careers in vision systems, big-data analytics and mining, image processing, visualization systems and software, and algorithmic problem-solving. Coursework covers computer vision, algorithmic approaches, machine learning, pattern recognition, big-data analytics and visualization, generative AI and large language models. Students study machine learning, neural networks, deep and reinforcement learning, image motion and tracking, the algorithmic foundations of robotics, parallel and high-performance algorithms, the human visual system and visual cognition, localization, mapping and navigation, and clustering and regression analysis.

Electromagnetics, Plasma, and Optics (ELPO)

This concentration studies the launching, propagation, confinement, and control of electromagnetic, acoustic, and optical wave fields, and their interaction with matter. It prepares students for careers in RF and microwave engineering, antenna engineering, radar, sonar, wavefield imaging, remote sensing, optics, photonics, acoustics, magnetism, and sensors, with applications in biomedical electronics, optical-fiber and wireless communications, geophysical exploration, radio astronomy, and nanotechnology. Coursework covers the theory and applications of electromagnetics, acoustics, optics, magnetism, modern imaging, photonic devices, biomedical optics, and microwave circuit design.

Hardware and Software for Machine Intelligence (HSMI)

This concentration prepares multifaceted systems engineers who bridge theory, software, and hardware. As AI solutions become more prevalent, practitioners must be fluent not only in the theoretical and software aspects of technology but also in the real-world hardware considerations that any solution must address. Graduates are skilled in developing machine-intelligence (MI) systems through hardware–software co-design of efficient, real-time, high-performance, distributed MI implementations that meet security and safety requirements.

Microsystems, Materials, and Devices (MSMD)

This concentration covers the fundamental theories, design approaches, fabrication methods, and measurement techniques behind high-performance, miniaturized sensing platforms, wireless devices, biochips, energy-harvesting devices, biosensors, and other emerging electronic products. Students gain experience with industry-standard simulation software and equipment, and may pursue research in

magnetic, ferroelectric, and magnetoelectric materials; the design and fabrication of micro/nano-electromechanical systems (MEMS/NEMS); analog, RF, digital, and mixed-signal integrated circuit design; and low-power very-large-scale integration (VLSI).

Power Systems, Power Electronics, and Motion Control (POWR)

This concentration covers the secure, efficient operation of electric generation, transmission, and distribution systems, and the design, modeling, and control of power converters and renewable energy systems. Coursework covers power system analysis, unbalanced operation, power electronics, sustainable energy, electric drives, and electric machines. Students learn to model and analyze large-scale power grids under normal and fault conditions and study the operating principles of DC-DC converters, inverters, rectifiers, AC-AC converters, and the modulation techniques used in power electronics.

2.4. The MSECE Graduate Curriculum

MSECE students, and PhD-BE students completing their MSECE requirements, must understand three course categories:

Fundamental Courses

Each concentration has four essential courses that provide fundamental, concentration-specific knowledge. Students must complete at least two of these four.

Concentration Courses

These courses provide depth in one of the seven MSECE concentrations and are listed by concentration starting in Section 22 and in the [Northeastern Catalog](#). Note that fundamental courses are a subset of concentration courses and some courses belong to multiple concentrations.

Which courses count depends on matriculation year: a course listed as a concentration course in the GPG for a student's matriculation year, or any later year, counts as a concentration course.

Concentration courses may be offered by ECE or a different department. No petition is required to register for a listed concentration course, ECE or non-ECE.

A non-ECE course that is not on the list may still count as a concentration course if its subject matter is closely related to the student's concentration — but only after a petition is filed and approved before registration (Section 17).

Excluded Courses

These courses cannot be used toward the MSECE degree and cannot be petitioned; they are generally non-ECE courses. See Section 22.9 for the full list.

3. Checklist for MSECE Course-only Track (MSC) Students

Use this checklist to track your progress toward the MSECE course-only track:

1. Read this document thoroughly. If in doubt, contact your academic advisor in GSE. You need 32 SH of graduate-level coursework to graduate; details below.
2. **Fundamental Course Requirements:** Take at least two of the four fundamental courses listed for your concentration in Section 22 (8 SH).
3. **Concentration Requirements:** Take and successfully complete at least six concentration courses for your concentration (24 SH) — see Section 22 or the NU Catalog for your matriculation year. Any fundamental course you take also counts as a concentration course.
4. Non-ECE courses are capped at two (8 SH) for CCSP, ELPO, MSMD, and POWR students, and at three (12 SH) for CSYS, CVLA, and HSMI students. If you cannot register for a planned non-ECE course, contact that department directly.
5. You may register once for EECE 6400 (Special Problems in ECE, 1–4 SH) during your MSECE program, with a faculty member's approval. If no section exists under that faculty member's name, file a Registration Override Request ([ROR](#)) to have one created; if a section already exists, register after submitting and receiving an approved override (Section 17).
6. Course-only track students may also register once for 4 SH of EECE 7945 (Master's Project) as a concentration course, with a faculty member's approval to supervise their project. Any tenured, tenure-track, affiliated, research, or teaching ECE faculty can serve as your project advisor (see the [ECE faculty directory](#)). If no section exists under the approving faculty member's name, file an [ROR](#) to have one created; if a section already exists, register after submitting and receiving an approved override (Section 17).
7. Up to 9 SH of graduate-level coursework may transfer from other institutions, subject to Graduate Affairs Committee (GAC) approval and a petition (Section 17). Transfer courses require a grade of at least B and must not have counted toward a previous degree. See Section 20 for details.

4. Checklist for MSECE Thesis Track (MST) Students

Use this checklist to track your progress toward the MSECE thesis-course track:

1. If you do not yet have a research advisor, contact your GSE advisor. To graduate you must complete 24 SH of graduate-level coursework plus 8 SH of thesis; details below.
2. Find a thesis advisor — any tenured, tenure-track, teaching, research, and affiliated ECE faculty member whose interests match yours and who agrees to serve as your thesis advisor (see the [ECE faculty directory](#)). You have one year from matriculation to find an advisor; if you cannot, you must petition to move to the MSECE course-only track (MSC), see Section 21.
3. **Fundamental Course Requirements:** Take at least two of the four fundamental courses listed for your concentration (8 SH).
4. **Concentration Requirements:** Take and successfully complete at least six concentration courses for your concentration (24 SH), see Section 22 or the NU Catalog for your matriculation year. Any fundamental course you take, and your 8 SH of thesis work (EECE 7945 and EECE 7990), also count as concentration courses.
5. Non-ECE courses are capped at three (12 SH) for all concentrations. If you cannot register for a planned non-ECE course, contact that department directly.
6. You may register once for EECE 6400 (Special Problems in ECE, 1–4 SH) during your MSECE program, with a faculty member's approval. If no section exists under that faculty member's name, file an [ROR](#) to have one created; if a section already exists, register after submitting and receiving an approved override (Section 17).
7. Up to 9 SH of graduate-level coursework may transfer from other institutions, subject to GAC approval and a petition (Section 17). Transfer courses require a grade of at least B and must not have counted toward a previous degree. See Section 20 for details.
8. **Thesis Requirements:** Register for EECE 7945 (MS Project), then EECE 7990 (MS Thesis) in the following semester, with the same advisor. Both require the advisor's approval. If no section exists under the approving faculty member's name, file an [ROR](#) to have one created; if a section already exists, register after submitting and receiving an approved override (Section 17).

Note 1: If you have not successfully defended your thesis after completing EECE 7945 and EECE 7990, register for EECE 7996 (MS Thesis Continuation, 0 SH). If no section exists under your advisor's name, file an [ROR](#); otherwise submit an override request (Section 17). A [signature page](#) is required upon completing the MS thesis.

Note 2: Before defending, form a Thesis Committee with your advisor with at least three members, at least two of whom are ECE faculty. A letter grade is assigned to EECE 7945 on successful completion, and to EECE 7990 upon a successful defense. Announce your defense date and location at least one week in advance, using [this form](#).

Note 3: LaTeX thesis templates are available [here](#); Word templates are on the COE website. Ask your graduate advisor for help if needed.

Note 4: If you are unable to continue with your original faculty member, you may move to the course-only track and either enroll in a remaining content course, or — if you have not already done so — register for EECE 6400, counting it toward your Concentration requirement. EECE 6400 may only be taken once.

5. Checklist for MSECE+LC Students

MSECE with Leadership Certificate students complete 36 SH of coursework: 16 SH of ENLR courses plus 20 SH following the same MSECE Concentration rules as the MST degree — except that MSECE+LC students take EECE 7440 and EECE 7442 in place of EECE 7945 and EECE 7990.

6. The MS in Artificial Intelligence (MSAI)

The MS in Artificial Intelligence gives students a comprehensive foundation in the algorithms, theory, and practical applications of a rapidly evolving field, preparing them to design, develop, and deploy AI systems across high-demand sectors. The core curriculum builds a solid grounding in both the theoretical and practical sides of AI.

Computer Vision concentration: Students gain the knowledge and skills to drive innovation at the intersection of emerging vision systems and AI, applying machine learning to image enhancement and restoration, object recognition, navigation, graphics rendering, and pattern classification.

Checklist for successful completion of the MSAI (see also Section 23):

- Complete 32 SH of coursework.
- Complete at least 16 SH of Core Requirements from the approved list.
- Complete at least 8 SH of Concentration Courses from the approved list.
- Complete at least 4 SH of Elective courses from the approved list.
- **Capstone:** Complete EECE 7945 (Master's Project) with a supervising faculty member.

MS Project Requirements: Registration requires a faculty member's approval. If no section exists under the approving faculty member's name, file an [ROR](#) to have one created; if a section already exists, register after submitting and receiving an approved override (Section 17).

7. The MS in Internet of Things (MSIoT)

The MSIoT is an interdisciplinary program developing experts and researchers in the growing field of IoT, offered jointly by Northeastern's Intelligent Networked Systems Institute (INSI), the ECE Department, and Khoury College of Computer Sciences. Students gain the skills to understand, design, implement, and evaluate autonomous wireless networked systems, through coursework, a master's thesis, supervised research across colleges, and/or industry experience.

MSIoT Options: Applicants choose the Coursework option or the Master's Project option at admission. Changing options is possible after one semester in the original option — see Section 21 for details, conditions, and requirements.

Checklist for successful progress toward the MSIoT:

- Complete 32 SH of coursework, choosing one of the two options below.
- **Coursework Option** (at least 28 SH of fundamental courses, plus at least 4 SH of concentration courses):
 1. EECE 5155 — Wireless Sensor Networks and the Internet of Things
 2. One wireless communication/networking course
 3. One algorithms course
 4. One data analysis/machine learning course
 5. One embedded systems or sensor course
 6. 4 SH of entrepreneurship, policy, or business coursework
 7. One course in security
 8. A concentration course from the COE/Khoury list — see Section 24
- **Master's Project Option** (same items 1–7 above, at least 28 SH total, plus): 4 SH of EECE 7945 (Master's Project), completed with a written report and presentation of research — see Section 17 on registration.

MSIoT+LC Option: Students complete 40 SH of coursework: 8 SH of ENLR courses ([list](#)) plus 32 SH following the same rules as the MST degree — except that MSIoT+LC students take EECE 7440 and EECE 7442 in place of EECE 7945, EECE 7990, EECE 6400, and HRMG 6280.

8. The MS in Wireless and Network Engineering Program (MSWiNE)

The MSWiNE, offered by INSI and the ECE Department, prepares researchers and specialized professionals for today's interconnected world. Through coursework, master's thesis research, and/or industry experience, students learn to understand, design, implement, and evaluate current and future wireless and wired communication networks, with research opportunities at Northeastern's Institute for the Wireless Internet of Things. The program suits students planning to continue into a PhD in electrical and computer engineering or a related field.

9.1. MSWiNE Options: Applicants choose the Coursework option or the Thesis option at admission. Changing options is possible after one semester in the original option — see Section 21 for details, conditions, and requirements.

Checklist for successful progress toward the MSWiNE:

- Complete 32 SH of coursework, choosing one of the two options below.
- **Coursework Option:**
 - At least 8 SH of fundamental courses: EECE 7374, EECE 5576, EECE 7364
 - At least 24 SH of concentration courses from the approved list — see Section 25
- **Project and/or Thesis Option:**
 - At least 8 SH of fundamental courses: EECE 7374, EECE 5576, EECE 7364
 - At least 16 SH of concentration courses from the approved list — see Section 25
 - At least 4 SH of MS Project (EECE 7945; a prerequisite for EECE 7990)
 - At least 4 SH of MS Thesis (EECE 7990); not required for the project-only option

Thesis Requirements: Register for EECE 7945 (MS Project), then EECE 7990 (Master's Thesis) in a later semester, with the same advisor. Both require the advisor's approval. If no section exists under the approving faculty member's name, file an [ROR](#) to have one created; if a section already exists, register after submitting and receiving an approved override (Section 17). Announce your defense at least one week in advance [here](#); a [signature page](#) is required upon completion.

9. The MS in Semiconductor Engineering (MSSCEN)

The MSSCEN bridges cutting-edge research and practical application. It is anchored by NanoSI, a world-leading institute for semiconductor research, education, and entrepreneurship at the forefront of next-generation chip-scale electronics, sensors, RF/mmWave devices and systems, photonics, MEMS, packaging, heterogeneous integration, and micro/nano manufacturing — all of which feed a program built to sharpen students' knowledge, research skills, and practical ability.

10.1. MSSCEN Concentrations: Applicants choose one of two concentrations. Students in the Devices and NanoSystems concentration follow the requirements below. Students in the Materials and Manufacturing concentration should contact their [Program Contacts](#) for requirements. To change concentration, reapply [here](#); once accepted, see Section 21 for details, conditions, and requirements.

Checklist for successful progress toward the MSSCEN — complete 32 SH of coursework, choosing one of three options:

a. Coursework Option (32 SH of Core, Concentration, and Restricted Elective courses): - At least 12 SH of Core Requirements from the [approved list](#) (the Innovation requirement cannot be met solely with Directed Study coursework) - At least 8 SH of Concentration courses from the [approved list](#) - At least 12 SH from the [Restricted Elective list](#)

b. Master's Project Option (at least 28 SH of Core, Concentration, and Restricted Elective courses, plus 4 SH of MS Project): - At least 12 SH of Core Requirements from the [approved list](#) (Innovation requirement cannot be met solely with Directed Study) - At least 8 SH of Concentration courses from the [approved list](#) - At least 8 SH from the [Restricted Elective list](#) - 4 SH of MS Project (EECE 7945) completed in one semester with a faculty member's approval, ending in a written report and presentation. If no section exists under the approving faculty member's name, file an [ROR](#); otherwise submit an override request (Section 17).

c. Master's Thesis Option (at least 24 SH of Core, Concentration, and Restricted Elective courses, plus 4 SH of MS Project and 4 SH of MS Thesis): - At least 12 SH of Core Requirements from the [approved list](#) (Innovation requirement cannot be met solely with Directed Study) - At least 8 SH of Concentration courses from the [approved list](#) - At least 4 SH from the [Restricted Elective list](#) - 4 SH of MS Project (EECE 7945), completed in one semester with a written report and presentation, followed by 4 SH of MS Thesis (EECE 7990) with the same advisor in a subsequent semester. Registration requires a faculty member's approval; if no section exists under their name, file an [ROR](#), otherwise submit an override request (Section 17). For Thesis Committee and process requirements, see Section 4, item 8. Announce your defense at least one week in advance [here](#); a signature page is required upon completion. - If you are unable to continue with your original faculty member, you may move to the course-only track and either enroll in a remaining content course, or — if you have not already done so — register for EECE 6400 with a different faculty member, counting it toward your Concentration requirement. EECE 6400 may only be taken once.

10. The PhD Program

10.1. Program Goals

PhD graduates gain analytical and technical knowledge, tools, and skills to address advanced engineering problems and conduct independent research in their specialization — by taking courses in Electrical or Computer Engineering, proposing and pursuing a research topic, and defending a dissertation. Graduates can analyze problems, formulate and design solutions, propose research ideas, conduct research, and produce new knowledge, using analytical, numerical, and experimental techniques.

10.2. PhD Concentrations

Students enter the PhD program either with a BS (PhD-BE) or a relevant master's degree (PhD-AE).

Applicants with a BS degree (PhD-BE): PhDCE students first complete master's requirements in one of the three concentrations CSYS, CVLA, or HSMT. PhDEE students first complete master's requirements in one of the four concentrations CCSP, ELPO, MSMD, or POWR. After finishing the master's requirements, the remainder of the PhD program follows the PhD-AE requirements below.

Applicants with a master's degree (PhD-AE): The notion of concentration does not directly apply.

A change of concentration or program (PhDCE $\leftrightarrow$ PhDEE, or from a PhD program to MSECE) is possible after completing one semester in the original program/concentration — see Section 21.

11. Checklist for PhD Students with MS Degree (PhD, Advanced Entry)

1. You are advised on academic matters by [GSE advisors](#).
2. A research advisor, or advisors in joint advising cases, is assigned to you at matriculation; after registration, please complete the [PhD Research Advisor Form](#), have your assigned advisor sign it, and upload it [here](#). In cases where you change advisors in the following semesters, you need to complete and upload the same form.
3. **Course Requirements:** Complete at least 16 SH of graduate-level coursework beyond your MS degree.
 - **Note 1:** Choose courses in consultation with your research advisor.
 - **Note 2:** At least 8 SH must be graduate-level ECE courses.
 - **Note 3:** A non-ECE course not on the approved Concentration lists requires a petition, filed and approved before registration (Section 17).
 - **Note 4:** You may register once for EECE 7400 (Special Problems in ECE, 1–4 SH) with a faculty member's approval. If no section exists under the approving faculty member's name, file an [ROR](#); if a section exists, register after submitting and receiving an approved override (Section 17).
 - **Note 5:** Up to 4 SH of graduate-level coursework may transfer from other institutions, subject to GAC approval and a petition (Section 17). Transfer courses require a grade of at least B and must not have counted toward a previous degree.
4. **Qualifying Exam:** You have two chances to pass the QE (details in Section 13.1). Passing it changes your status from "Predoctoral Student" to "PhD Candidate," typically marked as "Candidacy Achieved" on your transcripts. To do research before achieving candidacy, register for EECE 9986 (Research, 0 SH) under your advisor's name, with their approval. If no section exists under the approving faculty member's name, file an [ROR](#); if a section exists, register after submitting and receiving an approved override (Section 17).
5. Register for EECE 9990 and EECE 9991 (Dissertation Term 1 and Term 2, 0 SH) in the two consecutive semesters immediately after achieving candidacy. If no section exists under your advisor's name, contact your GSE academic advisor.
 - **Note:** If you have not defended after EECE 9990 and EECE 9991, which is common, register for EECE 9996 (Dissertation Continuation, 0 SH) every Fall, Spring, and Summer semester until you defend. You must register for a dissertation course during the Summer Full semester; to take the summer off, take a Leave of Absence. Contact coe-phd-gradadvising@northeastern.edu for help.
6. **PhD Committee:** Form your committee with your advisor not later than the completion of your second year after starting the PhD program. It must have at least three members, at least two of

them tenured or tenure-track ECE faculty. At least three members of the PhD committee must hold doctoral degrees, and at least one member must have no more than 50% appointment in the ECE Department. This, for example, can be from outside NU, from another department, or a joint member in ECE and another department whose appointment in ECE is not more than 50%. Complete the [PhD Committee Form](#) and upload it [here](#). See Section 13.2 for details.

7. **Dissertation Proposal Review** (also called the “Comprehensive Exam” or “Proposal Defense”): Consists of a written research proposal and presentation, open to faculty and students, followed by a closed Q&A with your PhD Committee. The date is set by your advisor and committee, after you have achieved candidacy, completed EECE 9990 and EECE 9991, and formed your committee; and must be within the first three years after starting the PhD program at NU. Submit the [Proposal Review Announcement Form](#) to announce it at least one week before the review date. After a successful defense, complete the [Dissertation Proposal Review Form](#), have it signed by your advisor and committee members, and upload it [here](#). If unsuccessful, the committee provides written recommendations and sets a date for a future review. See Section 13.3 for details.
8. **Dissertation Defense:** The final PhD requirement, consists of a presentation of your results, open to faculty and students, followed by a closed Q&A with your committee. It must be scheduled no sooner than six months after your proposal review, and all Dissertation and Dissertation Continuation courses must be graded by your advisor before scheduling. Dissertation defense must be scheduled not later than five years after starting the PhD program at NU. Announce it using the [Dissertation Defense Announcement Form](#), at least one week before the defense date. See Section 13.4 for details.
9. **Residency Requirement:** Register full-time at NU for at least two semesters after candidacy.
10. **Time Limitation:** You have five years to complete degree requirements.
11. You graduate once you have defended your dissertation and fulfilled your course and residency requirements.

See Section 13 for more on PhD stages and deadlines.

12. Checklist for PhD Students with no MS Degree (PhD, BS Entry)

1. You are advised on academic matters by GSE advisors.
2. **Course Requirements:** Satisfy the MSC or MST requirements, plus the course requirements for PhD students with an MS (PhD, Advanced Entry); see the corresponding sections of this guide.
 - **Note 1:** Your research advisor helps decide whether you follow MST or MSC requirements.
 - **Note 2:** PhD students may pursue an MS degree other than MSECE concurrently, by petitioning to add an ECE MS program to their enrollment (MSIoT, MSWiNE, MSROB, MSXR, MSDS, MSAI, MSSCEN, or MSSTATS).
 - **Note 3:** After completing MSC or MST requirements, you may petition to receive an MSECE degree, attaching a list of courses that satisfy your concentration's degree requirements. Your research advisor's approval is required.
3. **Qualifying Exam, Dissertation Proposal Review, Dissertation Defense:** Follow the same requirements as the Checklist for PhD Students with an MS Degree (Section 11).
4. **Deadlines:** For BS entry students the deadline for forming their PhD Committee is three years after starting the PhD program, the deadline for PhD proposal review is four years after starting the PhD program and for Dissertation Defense is seven years after starting the PhD program. Note that the Dissertation Defense must be scheduled at least six months after the Proposal Review.
5. **Residency Requirement:** Register full-time at NU for at least two semesters after candidacy.
6. **Time Limitation:** You have seven years after starting your PhD program to graduate.

See Section 13 for more on PhD stages and deadlines.

13. Stages and Deadlines in the PhD Program

Beyond course requirements, four milestones lead to the ECE PhD degree:

1. Passing the Qualifying Exam
2. Forming the PhD committee and filing the [PhD Committee Form](#)
3. Completing the Dissertation Proposal Review and filing the [Dissertation Proposal Review Form](#)
4. Defending the dissertation and filing it with GSE (the defense cannot be scheduled less than six months after the proposal review)

13.1. The Qualifying Exam and Candidacy Achievement

The QE is a critical PhD milestone. Students have two attempts: the first miss requires retaking it at the next deadline; a second miss requires leaving the program. Students are responsible for following the process and meeting the deadlines below.

Deadlines: There are two — one for the QE proposal form and one for reporting the exam result — set by your semester of entry. Missing either is equivalent to failing the exam.

- **Proposal form deadline:** September 30, 2027 for students entering Fall 2026; March 31, 2028 for students entering Spring 2027.
- **Result-reporting deadline:** December 31, 2027 for students entering Fall 2026; June 30, 2028 for students entering Spring 2027.

Process:

1. You and your advisor form a QE committee (at least three members, at least two of them tenured or tenure-track ECE faculty).
2. Complete the [QE Proposal Form](#) by the proposal deadline and submit it [here](#).
3. Download the QE Result Report form from [HERE](#). Complete the form before the exam, except for the “result” field and signatures; print it and bring it along to the exam.
4. Take the exam: a written report on the proposed subject, submitted to your committee beforehand; a presentation of up to 20 minutes; and a 40–50 minute Q&A that may cover the report and your general knowledge.
5. After exam, give the QE Result Report Form to the committee to enter the result and sign the form.
6. Upload the completed form [here](#).

Recommendation: Schedule the proposal and exam well ahead of these deadlines — they fall during busy periods for faculty, and advance planning creates a buffer for the unexpected. Ask your advisor to report results as soon as possible, ideally the day of the exam.

13.2. Forming the PhD Committee

The committee must have at least three members: at least two tenured or tenure-track ECE faculty, and at least three members holding doctorate degrees. Co-advisors together count as one committee member. At least one member must be from outside NU, from another department, or an ECE faculty member who has an appointment of at least 50% outside the ECE department.

Once formed, complete the [PhD Committee Form](#), have it signed, and file it as described above. The deadline is one year after the QE result-reporting deadline (Section 13.1). File a new form whenever the committee's composition changes.

13.3. Dissertation Proposal Review

The student prepares a written research proposal and presents it orally; the presentation is open to faculty and students, followed by a closed Q&A with the PhD committee. Announce the presentation at least one week ahead using [this form](#). The committee weighs:

1. The merit of the proposed research as a PhD dissertation
2. Substantial evidence of research progress
3. Knowledge of the research area and related work
4. Ability to present results orally and answer related questions

The advisor and committee set the review date, which must follow candidacy, completion of EECE 9990 and EECE 9991, and formation of the committee. The deadline is three years, for PhD-AE students, and four years, for PhD-BE students, after starting their PhD program. It is strongly recommended that the proposal review be arranged as early as feasible: because the defense cannot be scheduled less than six months after the review, scheduling it early protects your defense timeline.

After a successful review, complete the [Dissertation Proposal Review Form](#), have it signed by your advisor and committee, and upload it [here](#). If unsuccessful, the committee gives written recommendations and sets a date for a future review.

13.4. Dissertation Defense

Schedule your dissertation defense no sooner than six months after your proposal review. Before scheduling, ensure your advisor has graded all Dissertation and Dissertation Continuation courses; you cannot defend or graduate with ungraded courses outstanding. Announce your defense using [this form](#) at least one week before the defense date. LaTeX templates are available [here](#); Word templates are on the COE website; ask your advisor for help if needed.

13.5. Residency Requirement

Register full-time at NU for at least two semesters after achieving candidacy (the two summer half-semester count as one full semester).

13.6. Time Limitation

PhD-AE and PhD-BE students have five or seven years, respectively, to complete all requirements of their degree.

13.7. PhD Annual Review

Your performance and progress toward your degree is reviewed annually. This process is administered by GSE (see the GSE website for details).

- An **Unsatisfactory** grade places you on probation; you meet with your advisor for feedback and are reviewed again after six months. If you have not improved by October 15, you are removed from the program.
- A **Needs Improvement** grade is a prompt to meet with your advisor and adjust your approach. You cannot receive this grade twice in a row. A second consecutive “Needs Improvement” becomes “Unsatisfactory.”
- Two consecutive years of **Unsatisfactory** grades result in termination from the PhD program.

13.8. PhD Program Deadlines

The following deadlines apply to PhD-AE and PhD-BE programs

Milestone	Bachelor's-entry	Master's-entry
Coursework substantially complete	Year 2	Year 2
Qualifying / comprehensive exam(s) passed	Year 2	Year 2
Dissertation committee formed	Year 3	Year 2
Dissertation proposal / prospectus approved	Year 4	Year 3
Annual progress review	Every year	Every year
Dissertation defense (target)	Year 7	Year 5

14. PhD Program Policies

14.1. PhD Research Advisor Form Requirement

At the start of any advisor–advisee relationship, both parties must complete and sign a PhD Research Advisor Form (links provided throughout this guide). The form formalizes the advisor’s academic and financial commitment and documents the student’s academic and research commitments.

14.2. PhD Advisor Relationship Requirement

Once a student and faculty member agree to work together, they submit a signed [PhD Advisor Form](#), establishing a minimum four-semester commitment from the date of submission.

Graduation is not possible without an official advisor. A student who cannot secure a new advisor within or beyond the three-semester transition window (Section 14.4), must withdraw from the PhD program or move to a master’s program.

14.3. PhD Advisee/Advisor Separation

If the advisor initiates separation due to unsatisfactory performance, they must first issue a written warning starting a “performance probation” period of at least four months. The warning must (i) explain the deficiency and (ii) define a four-month action plan for the student to demonstrate acceptable progress. The action plan takes effect once approved by the Associate Chair of Graduate Studies. During probation, the advisor remains the student’s advisor of record and continues to mentor and support them, the probation and transition periods do not overlap.

If the student does not sufficiently address the deficiencies within the probation period, they lose their advisor and enter the transition period (Section 14.4). A student may also elect to leave the lab during probation, which likewise starts the transition period; they must notify both the advisor and the ECE Program Contact in writing by the end of the first month of probation.

If the student initiates separation, they must first speak with the ECE Program Contact, then send formal written notice to both their advisor and the Program Contact. If this happens mid-semester, the transition cannot begin until the semester ends; the student continues working on the advisor’s projects, and the faculty member continues to support them, through the end of the term. At the same time, the student must apply for a TA position or secure a new advisor before the next semester begins.

Notification deadlines for a departmental transition are October 31 (Fall), March 1 (Spring), and June 30 (Summer). Notifying after these dates means a TA position cannot be guaranteed; the department will try to accommodate late requests, but availability may require the student to take a Leave of Absence (LOA) for that term.

Once in the transition period, the student has three semesters to secure a new PhD advisor, and may be supported as a TA for at most two semesters during that time. Once an advisor is identified, the student must submit a [PhD Research Advisor Form](#).

Additional notes:

- A student cannot elect to leave their advisor during a PhD Annual Review: if graded Unsatisfactory, the student must remain with their advisor through the next Annual Review, and may not go on internship during that period — they must continue as an RA under the advisor's supervision so their progress can be fairly assessed by the deadline of October 30.
- First-year PhD students may not leave their advisor/group; they must remain through their first Fall, Spring, and Summer semesters. If, at the end of the first year, the relationship proves unsustainable, the advisor and advisee may separate under the rules above.
- **Students who are unadvised are not in Good Standing** with their PhD program (Section 14.9). Once a student secures an advisor, they return to Good Standing as long as they meet all other requirements.

14.4. Transition Period

A PhD student's transition period is the time they are unadvised. It begins at the start of the semester following departmental notification and separation from the previous advisor — or, if both parties simply announce an upcoming separation, at the start of the following semester. The transition period cannot exceed three semesters.

- If the department funds the student during Summer, that term counts as one of the two supported transition semesters (Summer 1 and Summer 2 each count as 0.5 TA, together equaling one full-time TA position). If another source funds the student's Summer, a grant or internship, that term does not count toward the two semesters.
- A student who takes an LOA during transition is still supported for at most two semesters as TA; while on LOA, they are otherwise unsupported. The LOA counts toward the three semester period that the student is given to secure a new advisor, except when the LOA is a medical, maternity, or paternity leave.

14.5. Departmental Support

Students have a maximum of three semesters to secure a new advisor. The department funds unadvised students for a maximum of two semesters, covering enrollment in content courses and/or research credits so students can secure a permanent advisor without losing progress.

Students in transition should discuss funding options with the ECE Program Contact, and the Director of Administration and Finance. The student is responsible for finding a new advisor or applying for TA positions. To begin a transition the following semester, the department must be notified no later than October 31 (Fall), March 1 (Spring), or June 30 (Summer).

While unadvised, a student may register for EECE 6400 or EECE 7400 (Special Problems in ECE) to earn credit while researching under a consenting faculty member, exploring potential advisory relationships. If no tentative advisor is yet identified, register for the PhD research course (EECE 9986, 0 SH) under the Associate Chair for Graduate Studies until one is found.

If that collaboration succeeds, the student can advance to formal doctoral research by registering for EECE 9986, 9990, 9991, or 9996 — at which point both parties complete and submit a PhD Advisor Form, formalizing the relationship and its mutual commitments.

14.6. TA Policy for Transfer Students

Students transferring into the NEU PhD ECE program are generally treated as first-years and are not eligible for TA positions. An exception applies to transfer students who continue working with their previous advisor: they remain eligible for available TA positions, subject to advisor support and position availability.

14.7. TA/HCA Policies, Expectations, Support, and Training

14.7.1. Onboarding and Training

Initial onboarding: Faculty meet with TAs/HCAs at the start of the semester to define responsibilities, followed by an email outlining tasks and timelines.

Training materials: Faculty provide lab assignments in advance and any needed materials (code templates, solutions, grading rubrics), involve lab technicians in equipment training, and — when delegating grading — furnish complete solutions and rubrics.

Ongoing training: Regular TA/HCA meetings (1–2 times weekly) prepare for upcoming labs; TAs/HCAs complete lab assignments in advance (about 2 hours/week) and attend weekly office hours.

Professional standards: Faculty maintain patience, courtesy, reasonable flexibility on deadlines, and clear, professional communication throughout.

14.7.2. Role Expectations

Eligibility and compensation

- **Teaching Assistants (TAs):** PhD students only, supporting course instruction and assessment.
- **Hourly Course Assistants (HCAs):** MS or undergraduate students only, not on Co-op, paid hourly (10, 15, or 20 hours/week, competitive positions) valuable for CV-building and developing public-speaking and professional skills.

Core responsibilities (both TAs and HCAs):

- *Office hours:* hold regular hours at specified times/locations; provide 1:1 or group support; serve as an approachable resource.
- *Course material preparation:* prepare materials and demonstration projects in advance; assist with lab setup.
- *Student support:* buffer between students and faculty; respond promptly; create engagement opportunities.
- *Attend course lectures:* If required by the course instructor.

TAs specifically may lead labs or discussion sections, administer exams and quizzes, hold full grading responsibility, and monitor student progress throughout the semester.

HCA's specifically focus on peer support and course-material development, with limited grading responsibility. (Undergraduate HCA's are discouraged from grading other undergraduates' work.) The emphasis is on building teaching and mentoring experience.

14.7.3. Expected Learning Outcomes

Accountability and self-management: strong organization and time management; consistent office hours; ongoing communication with the supervisor about workload; effective multitasking and prioritization; prompt responses to requests (grading, meetings, Canvas updates); ownership of assigned work; proactively seeking and offering help; adherence to the course outline and schedule; punctuality and reliability.

Oral and written communication: effective communication across diverse audiences; accurate, enthusiastic delivery of course content; active listening; courtesy and patience; clear communication calibrated to the audience; constructive feedback to colleagues on request; composure under stress.

Quality of work: thorough, accurate, well-organized work; consistent deadlines; prompt responses; high, consistent performance; openness to constructive criticism; FERPA-compliant confidentiality; respect for academic integrity and university policy; clear assignment instructions; preparedness for each session.

Subject knowledge and learning ability: quick uptake of new course content; interest in teaching pedagogy; timely, accurate answers to student questions; comfort with relevant technologies (Canvas, PowerPoint, Excel, lab hardware/software); staying current in the field.

Teaching and presentation ability: effective monitoring and evaluation of student progress; appropriate use of approved materials; competent exam/lab administration; creating opportunities for engagement; a team-oriented attitude; attendance at required sessions; strong working relationships across diverse groups; responsiveness to student perspectives.

Professional development benefits: both TAs and HCA's gain practical teaching and mentoring experience, professional communication skills, public-speaking opportunities, time-management expertise, experience with diverse student populations, and credentials for future academic or professional positions.

14.9. Good Standing

PhD students must maintain Good Standing throughout the program. A student falls out of Good Standing if they:

1. Let their cumulative GPA drop below 3.0
2. Receive an Unsatisfactory grade in any dissertation course
3. Receive an Unsatisfactory Annual Review evaluation
4. Become and remain unadvised without securing a new advisor within the allotted three-semester window

Students who do not reestablish Good Standing within the departmental timeframe, while meeting all other program requirements, risk dismissal and immediate termination of all departmental and Research Assistantship funding. The department monitors these criteria to ensure doctoral candidates maintain appropriate academic progress and research productivity.

14.10. PhD Annual Review

If a student is graded Unsatisfactory, they remain with their current advisor through the next review cycle, six months later, and are not in Good Standing in the interim. That next review occurs October 15, when the advisor determines whether sufficient progress has been made; the advisor remains financially responsible through the end of the Fall semester. The outcome of the second review is either Satisfactory or Unsatisfactory.

- If progress is satisfactory, advisor and advisee decide together whether to continue; the student is considered in Good Standing as long as all other requirements are met.
- If they decide to separate despite satisfactory progress, the student enters the Transition period (Section 14.4), and, being unadvised, is not in Good Standing during that time.
- If progress remains Unsatisfactory a second time, the student is dismissed from the PhD program; the ECE Program Contact must be notified of the outcome.
- A student slated for an October 15 review due to unsatisfactory progress will still be reviewed even if they take an LOA, except in cases where LOA is medical, maternity, or paternity.

Annual Review grades:

- **Outstanding Progress:** exceeding expectations across all areas; these students are typically nominated by their advisor for COE/ECE awards.
- **Satisfactory Progress:** meeting program expectations and requirements.
- **Needs Improvement:** some progress shown, but greater effort is needed in other areas. This grade cannot be received two years in a row — a second consecutive “Needs Improvement” becomes “Unsatisfactory,” which is not Good Standing.
- **Unsatisfactory Progress:** not meeting program expectations or requirements; not in Good Standing with the program or department.

14.11. PhD Registration Requirement

PhD students must register every term — Fall, Spring, and Summer. While advisors guide course selection, students are responsible for maintaining full-time status by registering for one of:

1. Two content courses (8 SH), or
2. An appropriate dissertation course (EECE 9986, 9990, 9991, or 9996), or
3. An appropriate internship course (ENGR 9700 — FT Internship, or ENGR 9702 — PT Internship)

Registration must be continuous. To pause temporarily, request a Leave of Absence (LOA) from coe-phd-gradadvising@northeastern.edu. Failing to register properly, or to secure an approved LOA, can jeopardize academic standing, visa status, and continued funding.

15. PhD Program: Financial Support from Advisor

When a student accepts a PhD offer, the faculty advisor commits to funding that student's year-round registration (Fall, Spring, Summer) — a mutual commitment intended to span up to five years.

During the first four semesters, both parties are expected to sustain the relationship unless the Department Chair approves a formal separation. The advisor provides academic guidance and mentorship; the advisee engages fully in research and academic responsibilities. At the end of the fourth semester, either party may elect to separate if a different arrangement would serve them better; the advisee then enters a supported transition period at the end of the semester while identifying new advisory opportunities (Section 14.4).

Note: Funding depends on the student maintaining Good Standing (Section 14.9). Students in Good Standing can expect continued support; those who fall out of Good Standing may see funding interrupted.

16. PhD Program: Financial Support

PhD funding may come from several sources. Faculty advisors typically provide Research Assistantship (RA) funding throughout the program, giving students financial stability to focus on their studies.

When other funding opportunities arise — scholarships, internships, grants, or external employment — advisors share this information with the department to help coordinate support and keep the department informed of available opportunities.

Teaching Assistant (TA) positions offer valuable professional development. The department provides up to four TA appointments over a student's program, awarded through merit-based selection that weighs academic excellence, subject expertise, and relevant experience — positions are not guaranteed and depend on departmental need. Extending TA support beyond four semesters requires approval from the TA/HCA committee and position availability.

Teaching assistantships build classroom and pedagogical skills alongside research training; advisors remain primarily responsible for consistent research funding, stepping in when external funding does not materialize as expected, so students can keep making progress without funding interruptions.

17. Petition and Registration Override Procedures

- Petitions and overrides for taking courses must be filed and approved **before** registering for the course.
- Filing a petition or override does not guarantee approval.
- File well in advance — processing takes at least 5 business days.

File a petition or override on the [Graduate Forms](#) page, and attach your transcript; petitions without one will not be processed.

The Graduate School uses Adobe Sign for all forms. Submit the completed form to the Assistant Director of Academic Programs. PhD and MS-Thesis students should also copy their research advisor, if applicable. Approved forms go to the Graduate School for review; once complete, a copy is emailed to the student and placed in their e-folder. For questions, contact coe-ece-gradadvising@northeastern.edu.

18. Probation Policies and Procedures

See the College of Engineering's [Probation Policies](#) page for details.

19. Coop and Internship Policies and Procedures

Co-op and internship are forms of Curricular Practical Training (CPT) that let full-time students integrate practical experience into their graduate program. For details, see the [Graduate Co-op](#) page.

20. Policies and Procedures for Course Transfer

MS students (MSECE, MSIoT, MSWiNE, MSROB, MSSCEN, MSXR, MSSTATS), PhD-BE students, and PhD-AE students may transfer up to 9 SH, 14 SH, and 4 SH (or equivalent), respectively, from other institutions. (4 SH is defined as 45 hours of lecture.) Transfer credit requires:

- A grade of at least B (or equivalent) in the course
- That the course was not part of a degree the student has already received
- Review and approval by the Graduate Affairs Committee as a valid graduate-level course
- That the credit was earned within five academic years of matriculation

To request a transfer, file a petition (Section 17) with your transcript showing the grade and term, the course's detailed syllabus, and evidence the course was not counted toward a previous degree (noted on the transcript).

21. Policies and Procedures for Requesting Change in the Graduate Program

Changes to your graduate program generally require completing at least one semester at Northeastern, giving you time to make an informed decision. The one exception — a change from full-time to part-time, or vice versa — can be requested during the first semester but does not apply to F-1 visa holders.

- **FT ↔ PT:** File a petition (Standard Petition) as described in Section 17. This is the only change that can be requested in the first semester.
- **Change of concentration (MSC/MST):** Requires a minimum 3.00 cumulative GPA. Students cannot apply if they have passed more than 16 SH (Introduction to Cooperative Education does not count toward this 16 SH limit). Students must have completed 4 SH with grade A, or 8 SH with an average grade of 3.5 or better in the target concentration. To request a change in your concentration, complete the Change of Concentration form [here](#). After approval, file a petition for the change (Section 17).
- **MST → MSC:** File a petition (Section 17) after completing at least one semester at NU.
- **MSC → MST:** File a petition (Section 17) with either the new thesis advisor's signature on the petition or an attached letter of support. The advisor must be ECE faculty (tenured/tenure-track, teaching, research, or affiliated).
- **PhDEE ↔ PhDCE:** File a petition (Section 17) and complete a new application via a [new account](#) — the application fee is waived. If also changing research advisor, file a new [PhD Research Advisor Form](#).
- **PhD → MS:** File a petition (Section 17) with your research advisor's signature.
- **MS → PhD:** File a petition (Section 17) and complete a new application via a new Slate account; the application fee is waived.

International students: An approved program change requires a new I-20. Initiating the I-20 process is the student's responsibility — instructions are on the official admission acceptance letter; direct questions to OGS.

Plus-One students may request a change in their concentration through their PlusOne advisor.

22. Fundamental, Concentration and Excluded Courses

Each subsection below lists the four fundamental courses and the full set of concentration courses for one of the seven MSEE concentrations. Fundamental courses are a subset of concentration courses; a course may appear under more than one concentration.

Communications, Control, and Signal Processing (CCSP)

Fundamental Courses

Course	Title	SH	Notes
EECE 5576	Wireless Communication Systems	4 SH	
EECE 5666	Digital Signal Processing	4 SH	
EECE 7200	Linear Systems Analysis	4 SH	
EECE 7204	Applied Probability and Stochastic Processes	4 SH	

Concentration Courses

Course	Title	SH	Notes
EECE 5115	Dynamical Systems in Biological Engineering	4 SH	
EECE 5155	Wireless Sensor Networks and the Internet of Things	4 SH	
EECE 5550	Mobile Robotics	4 SH	
EECE 5552	Principles of Assistive Robotics	4 SH	
EECE 5555	Formal Methods for Robotics and Control	4 SH	
EECE 5576	Wireless Communication Systems	4 SH	
EECE 5578	Terahertz Communication	4 SH	
EECE 5580	Classical Control Systems	4 SH	
EECE 5582	Making Systems Reliable – An Introduction to Coding Theory	4 SH	
EECE 5610	Digital Control Systems	4 SH	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	4 SH	
EECE 5626	Image Processing and Pattern Recognition	4 SH	
EECE 5665	Signal Processing for Global Navigation Satellite Systems	4 SH	
EECE 5666	Digital Signal Processing	4 SH	
EECE 5698	Special Topics: Formal Methods for Dynamical Systems	4 SH	
EECE 5698	Special Topics: GNSS Signal Processing	4 SH	

Course	Title	SH	Notes
EECE 5698	Special Topics: Introduction to Molecular Systems Biology Dynamic Modeling	4 SH	
EECE 5698	Special Topics: Spectrum Policy Issues for Wireless Communication Innovators	4 SH	
EECE 6400	Special Problems in ECE	4 SH	(For MSECE and PhD-BS students only)
EECE 7200	Linear Systems Analysis	4 SH	
EECE 7204	Applied Probability and Stochastic Processes	4 SH	
EECE 7211	Nonlinear Control	4 SH	
EECE 7213	System Identification and Adaptive Control	4 SH	
EECE 7214	Optimal and Robust Control	4 SH	
EECE 7215	Introduction to Distributed Intelligence	4 SH	
EECE 7223	Riemannian Optimization	4 SH	
EECE 7310	Modern Signal Processing	4 SH	
EECE 7311	Two-Dimensional Signal and Image Processing	4 SH	
EECE 7315	Digital Image Processing	4 SH	
EECE 7323	Numerical Optimization Methods	4 SH	
EECE 7324	Experimental Approach to Wireless Communication	4 SH	
EECE 7336	Digital Communications	4 SH	
EECE 7337	Information Theory	4 SH	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	4 SH	
EECE 7346	Probabilistic System Modeling and Analysis	4 SH	
EECE 7398	Special Topics: Advances in Communication Electronics	4 SH	
EECE 7398	Special Topics: Advances in Wireless Communication	4 SH	
EECE 7398	Special Topics: Bayesian Filtering and Tracking	4 SH	
EECE 7398	Special Topics: Distributed Intelligence	4 SH	
EECE 7398	Special Topics: Legged Robots	4 SH	
EECE 7398	Special Topics: Model-Based Deep Learning for Signal and Image Processing	4 SH	
EECE 7398	Special Topics: Systems Modeling and Analysis	4 SH	
EECE 7399	Effective Communication to Broad Audiences	4 SH	(only for PhD)

Course	Title	SH	Notes
EECE 7400	Advanced Special Problems in ECE	4 SH	(PhD-AE students only)
ME 7247	Advanced Control Engineering	4 SH	

Computer Systems and Software (CSYS)

Fundamental Courses

Course	Title	SH	Notes
EECE 5640	High Performance Computing	4 SH	
EECE 7205	Fundamentals of Computer Engineering	4 SH	
EECE 7352	Computer Architecture	4 SH	
EECE 7376	Operating Systems: Interface and Implementation	4 SH	

Concentration Courses

Course	Title	SH	Notes
EECE 5552	Principles of Assistive Robotics	4 SH	
EECE 5640	High Performance Computing	4 SH	
EECE 5643	Simulation and Performance Evaluation	4 SH	
EECE 5698	Special Topics: Cyber-Physical Security of IoT Systems in the Age of AI	4 SH	
EECE 5698	Special Topics: Field Programmable Gate Arrays in the Cloud	4 SH	
EECE 5698	Special Topics: Nano-Computing System Design	4 SH	
EECE 5699	Computer Hardware and System Security	4 SH	
EECE 6400	Special Problems in ECE	1-4 SH	(For MSECE and PhD-BS students only)
EECE 7205	Fundamentals of Computer Engineering	4 SH	
EECE 7352	Computer Architecture	4 SH	
EECE 7353	VLSI Design	4 SH	
EECE 7368	High-Level Design of Hardware & Software Systems	4 SH	
EECE 7376	Operating Systems: Interface and Implementation	4 SH	
EECE 7390	Computer Hardware Security	4 SH	
EECE 7398	Special Topics: Advanced Computer Architecture	4 SH	
EECE 7398	Special Topics: Compilers	4 SH	

Course	Title	SH	Notes
EECE 7399	Effective Communication for Broad Audiences	4 SH	(For PhD students only)
EECE 7400	Advanced Special Problems in ECE	1-4 SH	(For PhD-AE students only)
CS 5200	Database Systems Management	4 SH	
CS 5500	Foundations of Software Engineering	4 SH	
CS 5600	Computer Systems	4 SH	
CS 6410	Compilers	4 SH	
CS 6510	Advanced Software Development	4 SH	
CS 6650	Building Scalable Distributed Systems	4 SH	

Computer Vision, Machine Learning, and Algorithms (CVLA)

Fundamental Courses

Course	Title	SH	Notes
EECE 5554	Robotics Sensing and Navigation	4 SH	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	4 SH	
EECE 7205	Fundamentals of Computer Engineering	4 SH	
EECE 7352	Computer Architecture	4 SH	

Concentration Courses

Course	Title	SH	Notes
EECE 5360	Combinatorial Optimization	4 SH	
EECE 5512	Networked XR System	4 SH	
EECE 5550	Mobile Robotics	4 SH	
EECE 5554	Robotics Sensing and Navigation	4 SH	
EECE 5555	Formal Methods for Robotics and Control	4 SH	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	4 SH	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	4 SH	
EECE 5626	Image Processing and Pattern Recognition	4 SH	
EECE 5639	Computer Vision	4 SH	
EECE 5640	High Performance Computing	4 SH	

Course	Title	SH	Notes
EECE 5642	Data Visualization	4 SH	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	4 SH	
EECE 5645	Parallel Processing for Data Analytics	4 SH	
EECE 5668	Large Language Models	4 SH	
EECE 5698	Special Topics: Autonomous AI Agent Systems: Design and Engineering		
EECE 5698	Special Topics: Cyber-Physical Security of IoT Systems in the Age of AI	4 SH	
EECE 5698	Special Topics: Formal Methods of Dynamical Systems	4 SH	
EECE 5698	Special Topics: Robot System Server	4 SH	
EECE 5698	Special Topics: Visual Sensing & Computing Co-Design Edge Machine Perception	4 SH	
EECE 6400	Special Problems in ECE	1-4 SH	(For MSECE and PhD-BS students only)
EECE 7150	Autonomous Field Robotics	4 SH	
EECE 7204	Applied Probability and Stochastic Processes	4 SH	
EECE 7205	Fundamentals of Computer Engineering	4 SH	
EECE 7215	Introduction to Distributed Intelligence	4 SH	
EECE 7223	Riemannian Optimization	4 SH	
EECE 7268	Verifiable Machine Learning	4 SH	
EECE 7311	Two-Dimensional Signal and Image Processing	4 SH	
EECE 7315	Digital Image Processing	4 SH	
EECE 7323	Numerical Optimization Methods	4 SH	
EECE 7337	Information Theory	4 SH	
EECE 7345	Big Data and Sparsity in Control, Machine Learning and Optimization	4 SH	
EECE 7346	Probabilistic System Modeling and Analysis	4 SH	
EECE 7352	Computer Architecture	4 SH	
EECE 7370	Advanced Computer Vision	4 SH	
EECE 7373	Machine Learning with Small Data	4 SH	
EECE 7397	Advanced Machine Learning	4 SH	
EECE 7398	Special Topics: Advances in Deep Learning	4 SH	
EECE 7398	Special Topics: Bayesian Filtering and Tracking	4 SH	

Course	Title	SH	Notes
EECE 7398	Special Topics: Deep Learning for Embedded Systems	4 SH	
EECE 7398	Special Topics: Distributed Intelligence	4 SH	
EECE 7398	Special Topics: Flexible Robotics	4 SH	
EECE 7398	Special Topics: Human Centered Computing	4 SH	
EECE 7398	Special Topics: Model-Based Deep Learning for Signal and Image Processing	4 SH	
EECE 7398	Special Topics: Security in Large-Scaled Learning-Enabled Systems	4 SH	
EECE 7399	Effective Communication for Broad Audiences	4 SH	
EECE 7400	Advanced Special Problems in ECE	1-4 SH	(For PhD-AE students only)
CS 5100	Foundations of Artificial Intelligence	4 SH	
CS 6200	Information Retrieval	4 SH	
CS 6220	Data Mining Techniques	4 SH	
CS 7800	Advanced Algorithms	4 SH	
DS 5110	Essentials of Data Science	4 SH	
DS 5983	Topics in Data Science	4 SH	

Electromagnetics, Plasma, and Optics (ELPO)

Fundamental Courses

Course	Title	SH	Notes
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	4 SH	
EECE 7202	Electromagnetic Theory 1	4 SH	
EECE 7203	Complex Variable Theory and Differential Equations	4 SH	
EECE 7275	Antennas and Radiation	4 SH	

Concentration Courses

Course	Title	SH	Notes
EECE 5608	Magnetic Materials for Future Electronics	4 SH	
EECE 5651	Introduction to Photonic Devices	4 SH	
EECE 5652	Microwave Circuits and Networks	4 SH	
EECE 5653	Introduction to Quantum Engineering	4 SH	

Course	Title	SH	Notes
EECE 5654	Design and Prototyping of Optical Systems	4 SH	
EECE 5692	Antennas for Wireless Communication and Sensing	4 SH	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	4 SH	
EECE 5697	Acoustics and Sensing	4 SH	
EECE 5698	Special Topics: Design & Prototyping of Optical Systems for Engineering Apps	4 SH	
EECE 5698	Special Topics: Magnetic Materials and Devices for Microwave Engineering	4 SH	
EECE 5698	Special Topics: Photonic Devices for Communication Systems	4 SH	
EECE 5698	Special Topics: Quantum Hardware Platforms	4 SH	
EECE 5698	Special Topics: Silicon Photonics	4 SH	
EECE 5698	Special Topics: Superconducting Quantum Devices	4 SH	
EECE 6400	Special Problems in ECE	1- 4 SH	(For MSECE and PhD-BS students only)
EECE 7105	Optics for Engineers	4 SH	
EECE 7202	Electromagnetic Theory 1	4 SH	
EECE 7203	Complex Variable Theory and Differential Equations	4 SH	
EECE 7270	Electromagnetic Theory 2	4 SH	
EECE 7271	Computational Methods in Electromagnetics	4 SH	
EECE 7275	Antennas and Radiation	4 SH	
EECE 7284	Optical Properties of Matter	4 SH	
EECE 7293	Modern Imaging	4 SH	
EECE 7296	Electronic Materials	4 SH	
EECE 7398	Special Topics: Advanced Radio Frequency Passive Technologies	4 SH	
EECE 7398	Special Topics: Multiphysics Sim. for Elec, Acoustic, Photonic, & Magnet Devices	4 SH	
EECE 7398	Special Topics: Photonic Circuit Design for Information Processing	4 SH	
EECE 7399	Effective Communication for Broad Audiences	4 SH	(only for PhD students)
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering	1-4 SH	(PhD-AE only)

Hardware and Software for Machine Intelligence (HSMI)

Fundamental Courses

Course	Title	SH	Notes
EECE 5644	Introduction to Machine Learning and Pattern Recognition	4 SH	
EECE 7205	Fundamentals of Computer Engineering	4 SH	
EECE 7352	Computer Architecture	4 SH	
EECE 7353	VLSI Design	4 SH	

Concentration Courses

Course	Title	SH	Notes
EECE 5512	Networked XR System	4 SH	
EECE 5550	Mobile Robotics	4 SH	
EECE 5552	Assistive Robotics	4 SH	
EECE 5554	Robotics Sensing and Navigation	4 SH	
EECE 5555	Formal Methods for Robotics and Control	4 SH	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	4 SH	
EECE 5614	Reinforcement Learning and Decision Making under Uncertainty	4 SH	
EECE 5639	Computer Vision	4 SH	
EECE 5640	High-Performance Computing	4 SH	
EECE 5641	Introduction to Software Security	4 SH	(Students taking EECE 5641 can't receive credit for CY 5770)
EECE 5642	Data Visualization	4 SH	
EECE 5643	Simulation and Performance Evaluation	4 SH	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	4 SH	
EECE 5645	Parallel Processing for Data Analytics	4 SH	
EECE 5668	Large Language Models	4 SH	
EECE 5698	Special Topics: Autonomous AI Agent Systems: Design and Engineering		
EECE 5698	Special Topics: Cyber-Physical Security of IoT Systems in the Age of AI	4 SH	
EECE 5698	Special Topics: Field Programmable Gate Arrays in the Cloud	4 SH	

Course	Title	SH	Notes
EECE 5698	Special Topics: Formal Methods for Dynamical Systems	4 SH	
EECE 5698	Special Topics: Robot System Server	4 SH	
EECE 5698	Special Topics: Visual Sensing & Computing Co-Design Edge Machine Perception	4 SH	
EECE 5699	Computer Hardware and System Security	4 SH	
EECE 7150	Autonomous Field Robotics	4 SH	
EECE 7204	Applied Probability and Stochastic Processes	4 SH	
EECE 7205	Fundamentals of Computer Engineering	4 SH	
EECE 7215	Introduction to Distributed Intelligence	4 SH	
EECE 7268	Verifiable Machine Learning	4 SH	
EECE 7323	Numerical Optimization Methods	4 SH	
EECE 7337	Information Theory	4 SH	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	4 SH	
EECE 7346	Probabilistic System Modeling and Analysis	4 SH	
EECE 7352	Computer Architecture	4 SH	
EECE 7353	VLSI Design	4 SH	
EECE 7368	High-Level Design of Hardware-Software Systems	4 SH	
EECE 7370	Advanced Computer Vision	4 SH	
EECE 7373	Machine Learning with Small Data	4 SH	
EECE 7390	Computer Hardware Security	4 SH	
EECE 7393	Analysis and Design of Data Networks	4 SH	
EECE 7397	Advanced Machine Learning	4 SH	
EECE 7398	Special Topics: Advances in Deep Learning	4 SH	
EECE 7398	Special Topics: Bayesian Filtering and Tracking	4 SH	
EECE 7398	Special Topics: Deep Learning Embedded Systems	4 SH	
EECE 7398	Special Topics: Flexible Robotics	4 SH	
EECE 7398	Special Topics: Human Centered Computing	4 SH	
EECE 7398	Special Topics: Legged Robotics	4 SH	
EECE 7398	Special Topics: Model-Based Deep Learning for Signal and Image Processing	4 SH	
EECE 7399	Effective Communication for Broad Audiences	4 SH	(only for PhD students)

Course	Title	SH	Notes
IE 5360	Digital Manufacturing	4 SH	
CS 5180	Reinforcement Learning and Sequential Decision Making	4 SH	
CS 5335	Robotic Science and Systems	4 SH	
CS 7340	Theory and Methods in Human Computer Interaction	4 SH	
MATH 7233	Graph Theory	4 SH	

Microsystems, Materials, and Devices (MSMD)

Fundamental Courses

Course	Title	SH	Notes
EECE 5606	Micro- and Nanofabrication	4 SH	
EECE 7201	Solid State Devices	4 SH	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	4 SH	
EECE 7353	VLSI Design	4 SH	

Concentration Courses

Course	Title	SH	Notes
EECE 5161	Thin Film Technologies	4 SH	
EECE 5606	Micro- and Nanofabrication	4 SH	
EECE 5608	Magnetic Materials for Future Electronics	4 SH	
EECE 5647	Nanophotonics	4 SH	
EECE 5649	Design Analog Integrated Circuits Comp. Metal-Oxide-Semiconductor Tech	4 SH	
EECE 5651	Introduction to Photonic Devices	4 SH	
EECE 5652	Microwave Circuits and Networks	4 SH	
EECE 5653	Introduction to Quantum Engineering	4 SH	
EECE 5698	Special Topics: Biomedical Microsystems	4 SH	
EECE 5698	Special Topics: Flexible and Printed Electronics	4 SH	
EECE 5698	Special Topics: Introduction to Organic and Printed Electronics	4 SH	
EECE 5698	Special Topics: Magnetic Materials and Devices for Microwave Engineering	4 SH	
EECE 5698	Special Topics: Photonic Devices for Communication Systems	4 SH	
EECE 5698	Special Topics: Quantum Hardware Platforms	4 SH	

Course	Title	SH	Notes
EECE 5698	Special Topics: Semiconductor Packaging	4 SH	
EECE 5698	Special Topics: Silicon Photonics	4 SH	
EECE 5698	Special Topics: Superconducting Quantum Devices	4 SH	
EECE 5698	Special Topics: Tapeout a CMOS Chip	4 SH	
EECE 5698	Special Topics: Visual Sensing & Computing Co-Design Edge Machine Perception	4 SH	
EECE 6400	Special Problems in ECE	1-4 SH	(For MSECE and PhD-BS students only)
EECE 7201	Solid State Devices	4 SH	
EECE 7240	Analog Integrated Circuit Design	4 SH	
EECE 7248	Lab section for EECE 7240	0 SH	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	4 SH	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	4 SH	
EECE 7245	Microwave Circuit Design for Wireless Communication	4 SH	
EECE 7247	Radio Frequency Integrated Circuit Design	4 SH	
EECE 7250	Power Management Integrated Circuits	4 SH	
EECE 7284	Optical Properties of Matter	4 SH	
EECE 7296	Electronic Materials	4 SH	
EECE 7353	VLSI Design	4 SH	
EECE 7398	Special Topics: Advanced Radio Frequency Passive Technologies	4 SH	
EECE 7398	Special Topics: Advances in Communication Electronics	4 SH	
EECE 7398	Special Topics: Low Power Integrated Circuits Design	4 SH	
EECE 7398	Special Topics: Multiphysics Sim. for Elec, Acoustic, Photonic, & Magnet Devices	4 SH	
EECE 7398	Special Topics: Photonic Circuit Design for Information Processing	4 SH	
EECE 7399	Effective Communication for Broad Audiences	4 SH	(only for PhD students)
EECE 7400	Advanced Special Problems in ECE	1-4 SH	(For PhD-AE students only)

Power Systems, Power Electronics, and Motion Control (POWER)

Fundamental Courses

Course	Title	SH	Notes
EECE 5680	Electric Drives	4 SH	
EECE 5682	Power Systems Analysis 1	4 SH	
EECE 5684	Power Electronics	4 SH	
EECE 7200	Linear System Analysis	4 SH	

Concentration Courses

Course	Title	SH	Notes
EECE 5580	Classical Control Systems	4 SH	
EECE 5610	Digital Control Systems	4 SH	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	4 SH	
EECE 5680	Electric Drives 1	4 SH	
EECE 5681	Lab for EECE 5680	0 SH	
EECE 5682	Power Systems Analysis 1	4 SH	
EECE 5684	Power Electronics	4 SH	
EECE 5685	Lab for EECE 5684	0 SH	
EECE 5686	Electrical Machines	4 SH	
EECE 5688	Analysis of Unbalanced Power Grids	4 SH	
EECE 5690	Electric Vehicle Powertrains		
EECE 5698	Special Topics: Electric Vehicles	4 SH	
EECE 6400	Special Problems in ECE	1-4 SH	(For MSECE and PhD-BS students only)
EECE 7200	Linear System Analysis	4 SH	
EECE 7211	Nonlinear Control	4 SH	
EECE 7213	System Identification and Adaptive Control	4 SH	
EECE 7214	Optimal and Robust Control	4 SH	
EECE 7224	Power System State Estimation	4 SH	
EECE 7226	Modeling of Transients in Power Systems	4 SH	
EECE 7228	Advanced Power Electronics	4 SH	

Course	Title	SH	Notes
EECE 7250	Power Management Integrated Circuits	4 SH	
EECE 7323	Numerical Optimization Methods	4 SH	
EECE 7398	Special Topics: Bayesian Filtering and Tracking	4 SH	
EECE 7398	Special Topics: Power System Constrained Optimization	4 SH	
EECE 7399	Effective Communication for Broad Audiences	4 SH	(For PhD students only)
EECE 7400	Advanced Special Problems in ECE	1-4 SH	(For PhD-AE students only)

Special Courses

Course	Title	SH	Notes
EECE 7399	Effective Communication for Broad Audiences	4 SH	PhD students only — not available to MSC students. Counts as a non-concentration course for PhD-BE students; for PhD-AE students, counts as one of the 4 required courses after the MS degree.
EECE 7440 / EECE 7442	—	—	Open only to MSECE+LC students; coordinate with the Gordon Institute of Engineering Leadership.

Excluded Courses for All Concentrations

Excluded courses **cannot** be used toward the MSECE program, and cannot be petitioned — any such petition is automatically rejected. PhD students may register in an excluded course if their advisor recommends it, but cannot count it toward MSECE requirements if pursuing an MSECE degree en route to the PhD.

Excluded courses fall into three groups:

1. Courses offered by the Software Engineering and Information Systems (SEIS) program, with prefixes INFO, DAMG, CSYE, or TELE.

2. Courses offered by engineering leadership programs and ALIGN courses in Khoury College of Computer Sciences.
3. The following CS courses:

Course	Title	SH
CS 5010	Programming Design Paradigm	4 SH
CS 5320	Digital Image Processing	4 SH
CS 5330	Pattern Recognition and Computer Vision	4 SH
CS 5340	Computer/Human Interaction	4 SH
CS 5520	Mobile Application Development	4 SH
CS 5610	Web Development	4 SH
CS 5700	Computer Networks	4 SH
CS 5800	Algorithms	4 SH
CS 6140	Machine Learning	—
CS 6350	Empirical Research Methods	4 SH
CS 6710	Wireless Networks	4 SH
EECE 5314	Intro to Linear Algebra and Probability in Data Science	4 SH

Note: This exclusion list does not apply to MSIoT, MSWiNE, MSAI, MSROB, MSSTATS, MSXR, or MSSCEN.

23. Master of Science in Artificial Intelligence (MSAI)

Core Requirements

Course	Title	SH
EECE 5644	Machine Learning and Pattern Recognition	4 SH
or DADS 7275	Machine Learning and Data Analytics	4 SH
DS 5020	Introduction to Linear Algebra and Probability for Data Science	4 SH
or DADS 5200	Mathematics of Machine Learning	4 SH
CS 5130	Applied Programming and Data Processing for AI	—
CS 5100	Foundations of Artificial Intelligence	4 SH

Concentration Course List

Course	Title	SH
EECE 5639	Computer Vision	4 SH
EECE 5642	Data Visualization	4 SH
EECE 7370	Advanced Computer Vision	4 SH

Elective Course List

Course	Title	SH
EECE 5550	Mobile Robotics	4 SH
EECE 5554	Robotics Sensing and Navigation	4 SH
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	4 SH
EECE 5640	High Performance Computing	4 SH
EECE 5645	Parallel Processing for Data Analytics	4 SH
EECE 6400	Special Problems in Electrical and Computer Engineering	1–4 SH
EECE 7397	Advanced Machine Learning	4 SH
EECE 7398	Special Topics: Machine Learning with Small Data	4 SH

Capstone

Course	Title	SH
EECE 7945	Master's Project	4 SH

24. Master of Science in Internet of Things (MSIoT)

Fundamental Courses

Course	Title	SH
EECE 5155	Wireless Sensor Networks and the Internet of Things	4 SH

Additional fundamental-course options are listed in the [Northeastern Catalog](#).

Elective Course List

Course	Title	SH
EECE 5360	Combinatorial Optimization	4 SH
EECE 5512	Networked XR Systems	4 SH
EECE 5550	Mobile Robotics	4 SH
EECE 5554	Robotics Sensing and Navigation	4 SH
EECE 5576	Wireless Communication Systems	4 SH
EECE 5578	Terahertz Communication	4 SH
EECE 5606	Micro- and Nanofabrication	4 SH
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	4 SH
EECE 5639	Computer Vision	4 SH
EECE 5640	High-Performance Computing	4 SH
EECE 5641	Introduction to Software Security	4 SH
EECE 5642	Data Visualization	4 SH
EECE 5643	Simulation and Performance Evaluation	4 SH
EECE 5645	Parallel Processing for Data Analytics	4 SH
EECE 5649	Design of Analog Integrated Circuits with CMOS	4 SH
EECE 5652	Microwave Circuits and Networks	4 SH
EECE 5665	Signal Processing for Global Navigation Satellite Systems	4 SH
EECE 5666	Digital Signal Processing	4 SH
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	4 SH
EECE 5697	Acoustics and Sensing	4 SH
EECE 5698	Special Topics: Advanced Network Management	4 SH
EECE 5698	Special Topics: Spectrum Policy Issues for Wireless Communication Innovators	4 SH
EECE 5698	Special Topics: Visual Sensing and Computing Co-Design for Edge Machine Perception	4 SH
EECE 5699	Computer Hardware and System Security	—
EECE 7150	Autonomous Field Robotics	4 SH

Course	Title	SH
EECE 7200	Linear Systems Analysis	4 SH
EECE 7201	Solid State Devices	4 SH
EECE 7202	Electromagnetic Theory 1	4 SH
EECE 7204	Applied Probability and Stochastic Processes	4 SH
EECE 7205	Fundamentals of Computer Engineering	4 SH
EECE 7240	Analog Integrated Circuit Design	4 SH
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	4 SH
EECE 7245	Microwave Circuit Design for Wireless Communication	4 SH
EECE 7247	Radio Frequency Integrated Circuit Design	4 SH
EECE 7275	Antennas and Radiation	4 SH
EECE 7310	Modern Signal Processing	4 SH
EECE 7323	Numerical Optimization Methods	4 SH
EECE 7324	Experimental Approach to Wireless Communication	4 SH
EECE 7336	Digital Communications	4 SH
EECE 7337	Information Theory	4 SH
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	4 SH
EECE 7346	Probabilistic System Modeling and Analysis	4 SH
EECE 7352	Computer Architecture	4 SH
EECE 7370	Advanced Computer Vision	4 SH
EECE 7374	Fundamentals of Computer Networks	4 SH
EECE 7390	Computer Hardware Security	4 SH
EECE 7397	Advanced Machine Learning	4 SH
EECE 7398	Special Topics: Advances in Communication Electronics	4 SH
EECE 7398	Special Topics: Advances in Deep Learning	4 SH
EECE 7398	Special Topics: Advances in Wireless Communications	4 SH
EECE 7398	Special Topics: Deep Learning and Edge Computing in Wireless Networks	4 SH
EECE 7398	Special Topics: Security in Large-Scaled Learning-Enabled Systems	4 SH

25. Master of Science in Wireless and Network Engineering (MSWiNE)

Fundamental Courses

Course	Title	SH
EECE 5576	Wireless Communication Systems	4 SH
EECE 7364	Mobile and Wireless Networking	4 SH
EECE 7374	Fundamentals of Computer Networks	4 SH

Elective Course List

Course	Title	SH
EECE 5155	Wireless Sensor Networks and the Internet of Things	4 SH
EECE 5360	Combinatorial Optimization	4 SH
EECE 5512	Networked XR Systems	4 SH
EECE 5578	Terahertz Communication	4 SH
EECE 5610	Digital Control Systems	4 SH
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	4 SH
EECE 5640	High-Performance Computing	4 SH
EECE 5641	Introduction to Software Security	4 SH
EECE 5643	Simulation and Performance Evaluation	4 SH
EECE 5644	Introduction to Machine Learning and Pattern Recognition	4 SH
EECE 5645	Parallel Processing for Data Analytics	4 SH
EECE 5665	Signal Processing for Global Navigation Satellite Systems	4 SH
EECE 5666	Digital Signal Processing	4 SH
EECE 5692	Antennas for Wireless Communication and Sensing	4 SH
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	4 SH
EECE 5697	Acoustics and Sensing	4 SH
EECE 5698	Special Topics: Advanced Network Management	4 SH
EECE 5698	Special Topics: Cyber-Physical Security of IoT Systems in the Age of AI	4 SH
EECE 5698	Special Topics: Introduction to Legal Aspects in Electrical and Computer Engineering	4 SH
EECE 5698	Special Topics: Spectrum Policy Issues for Wireless Communications Innovators	4 SH
EECE 5699	Computer Hardware and System Security	4 SH

Course	Title	SH
EECE 6400	Special Problems in ECE	4 SH (MS and PhD-BS students only)
EECE 7200	Linear Systems Analysis	4 SH
EECE 7202	Electromagnetic Theory 1	4 SH
EECE 7204	Applied Probability and Stochastic Processes	4 SH
EECE 7205	Fundamentals of Computer Engineering	4 SH
EECE 7245	Microwave Circuit Design for Wireless Communication	4 SH
EECE 7247	Radio Frequency Integrated Circuit Design	4 SH
EECE 7275	Antennas and Radiation	4 SH
EECE 7324	Experimental Approach to Wireless Communication	4 SH
EECE 7336	Digital Communications	4 SH
EECE 7337	Information Theory	4 SH
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	4 SH
EECE 7352	Computer Architecture	4 SH
EECE 7393	Analysis and Design of Data Networks	4 SH
EECE 7398	Special Topics: Advances in Communication Electronics	4 SH
EECE 7398	Special Topics: Advances in Wireless Communications	4 SH
EECE 7398	Special Topics: Deep Learning and Edge Computing in Wireless Networks	4 SH
EECE 7398	Special Topics: Security in Large-Scaled Learning-Enabled Systems	4 SH
EECE 7399	Preparing for High Stakes Written and Oral Materials	4 SH (PhD and MST only)
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering	4 SH (PhD-AE students only)

26. Master of Science in Semiconductor Engineering (MSSCEN)

Core Requirements — Analog/Digital Circuits and Nanosystems

Course	Title	SH
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	4 SH
EECE 7240	Analog Integrated Circuit Design	4 SH
EECE 7248	Lab for EECE 7240	0 SH
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	4 SH
or ME 6260	Introduction to Microelectromechanical Systems (MEMS)	4 SH
EECE 7353	VLSI Design	4 SH

Core Requirements — Materials, Devices, and Manufacturing

Course	Title	SH
EECE 5161	Thin Film Technology	4 SH
EECE 5606	Micro- and Nanofabrication	4 SH
EECE 7201	Solid State Devices	4 SH
MATL 7365	Properties and Processing of Electronic Materials	4 SH
ME 5630	Nano- and Microscale Manufacturing	4 SH

Core Requirements — Innovation

Course	Title	SH
EECE 6400	Special Problems in ECE	1–4 SH
CHME 5976	Directed Study	1–4 SH
GE 5010	Customer-Driven Technical Innovation for Engineers	4 SH
GE 5100	Product Development for Engineers	4 SH
INNO 6200	Enterprise Growth and Innovation	4 SH
ME 5976	Directed Study	1–4 SH

Concentration Courses

Course	Title	SH
EECE 5161	Thin Film Technologies	4 SH
EECE 5606	Micro- and Nanofabrication	4 SH
EECE 5651	Introduction to Photonic Devices	4 SH

Course	Title	SH
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	4 SH
EECE 7201	Solid State Devices	4 SH
EECE 7240	Analog Integrated Circuit Design	4 SH
EECE 7248	Lab for EECE 7240	0 SH
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	4 SH
or ME 6260	Introduction to Microelectromechanical Systems (MEMS)	4 SH
EECE 7250	Power Management Integrated Circuits	4 SH
EECE 7353	VLSI Design	4 SH
MATL 7365	Properties and Processing of Electronic Materials	4 SH

Restricted Elective List: available in the [Northeastern Catalog](#), and includes EECE 7242 (Integrated Circuits for Mixed Signals and Data Communication).

27. Grading Guide for Special Graduate Courses

These courses require a registration override signed by the instructor/advisor.

Course	Title	Credits	Grading	Comments
EECE 6400*	Special Problems in ECE	4 SH	A to C– or F	Can be taken once, as an MSECE or PhD-BE student.
EECE 7400*	Advanced Special Problems in ECE	4 SH	A to C– or F	Can be taken once, as a PhD-AE student.
EECE 7945*	Master’s Project	4 SH	A to C– or F	Can be taken once — either standalone in the MSC track, or as the first part of thesis requirement in the MST track.
EECE 7990*	Master’s Thesis	4 SH	A to C– or F	Can be taken once — the second part of the MST track.
EECE 7996* (once only)	Master’s Thesis Continuation	0 SH	S/U	For students who have completed EECE 7945 and 7990 but have not yet defended their MS thesis. Does not maintain FT status — counts as PT* equivalent.
EECE 9986**	PhD Research	0 SH	S/U	For PhD students who have not passed the QE but want to do research, or who begin the program in a summer semester. Maintains FT** status.
EECE 9990** / EECE 9991**	Dissertation Term 1 / Term 2	0 SH	S/U	Taken in two consecutive semesters after passing the QE. Maintains FT** status.
EECE 9996**	Dissertation Continuation	0 SH	S/U	For PhD students who have completed EECE 9990 and 9991 but not yet defended. Maintains FT** status.

Please note the following:

- During an internship, students must be enrolled in either:
 - ENGR 9700 (Full-time Internship, 0 SH, FT** equivalent), or
 - ENGR 9702 (Part-time Internship, 0 SH, PT* equivalent) plus 4 SH of coursework, or one of: EECE 9986 (Research), EECE 9990 (Dissertation 1), EECE 9991 (Dissertation 2), or EECE 9996 (Dissertation Continuation) — each 0 SH, FT** equivalent.
- To register for an ENGR course, contact coe-phd-gradadvising@northeastern.edu.
- Students on Co-op must enroll in EECE 6964 (Coop Work Experience, 0 SH, FT** equivalent) or EECE 6954 (0 SH, PT* equivalent).
- In summer, register for these courses under Full Summer, not Summer 1 or 2.

- Continuing PhD students who have passed EECE 9991 must register for EECE 9996 (0 SH, FT equivalent) every semester.

(*) If a section exists under the advisor's name, register by filing an override form with the instructor/advisor's signature. If no such section exists, complete a [Registration Override Form](#) to request one, or contact their Program Contact. Taken alone, a starred course does not confer FT status — combine it with another course to reach 8 SH for the semester.

(**) Registration in this course is equivalent to full-time registration.

28. Course Registration Frequently Asked Questions

If you run into a registration issue, check here first. For anything else, contact your academic advisor

Q: I received a registration error. A: Complete a [Registration Override Request](#), including your transcript.

Q: I received a “College” error registering for a CS or CY course. A: Khoury students have priority for these courses, as ECE students do for EECE courses. Fill out the [Khoury Elective Form](#).

Q: I need to register for an MS Project, MS Thesis, or Research course. A: Fill out an [Override Request Form](#) — this grants registration access and prompts the Program Contact to create a section if needed.

Q: I have questions about tuition, financial aid, or a financial hold. A: Contact Student Financial Services: sfs@northeastern.edu.

Q: Can I audit a course? A: Generally yes, at the instructor’s discretion. Download an [audit form](#) from the Registrar’s website, get the instructor’s signature if approved, and submit it to the Registrar. Auditing is available in Fall and Spring only, not Summer.

29. Useful Links

General Information

- [Academic Integrity Policies](#)
- [Code of Student Conduct](#)
- [COE Co-op Eligibility](#)
- [COE Policies and Procedures](#)
- [COE Probation Policies](#)
- [Course Descriptions](#)
- [ECE Department website](#)
- [ECE Graduate Studies website](#)
- [Gordon Leadership Program](#)
- [Graduate School of Engineering](#)
- [NU Graduate Catalog](#)
- [NU Graduate Student Government](#)
- [Official University Academic Calendars](#)
- [Registrar's Office](#)
- [University Health and Counseling Services](#)
- [Office of Global Services \(OGS\)](#)

Forms

1. [Announcement from; MS Thesis Defense, PhD Proposal Review, or Dissertation Defense](#)
2. [COE Forms \(petition, registration override, etc.\)](#)
3. [PhD Dissertation Proposal Review Form](#)
4. [PhD Proposal Review Approval Form — Submission Link](#)
5. [Individual Instruction Registration Request](#)
6. [LaTeX templates for MS Thesis and PhD Dissertation](#)
7. [PhD Committee Form](#)
8. [PhD Committee Form — Submission Link](#)
9. [PhD Research Advisor Form](#)
10. [PhD Research Advisor Form — Submission Link](#)
11. [PhD Qualifying Report Form](#)
12. [Qualifying Exam Registration Form](#)
13. [Various ECE Forms](#)