

Electrical and Computer Engineering Department Graduate Handbook

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ECE Graduate Student Handbook

The Graduate School [Graduate Handbook](#) provides an overview of Graduate School functions and resources, as well as the rules, regulations, and procedures administered by the Graduate School. The ECE Department Graduate Student Handbook supplements the Graduate School Handbook and includes information specific to the ECE Department. It is the responsibility of all graduate students to know and understand the degree requirements as explained in both the ECE Department and Graduate School Handbooks. Students are responsible for the fulfillment of those requirements. NC State University notes official policies, regulations and rules (PRRs) on the university's [PRR website](#).

I. General Information

The Department of Electrical and Computer Engineering offers Certificate programs, Master of Science (MS) degree programs and Doctor of Philosophy (PhD) degree programs.

A. [Certificates Offered](#)

1. Electrical Engineering
2. Computer Engineering
3. ASIC Design & Verification
4. 5G Technologies
5. Nano-Systems Engineering
6. Renewable Electric Energy Systems

B. [MS Degrees Offered](#)

1. Electrical Engineering (EE)
2. Computer Engineering (CPE)
3. Computer Networking (CNE)
4. Electric Power Systems Engineering (EPSE)

MS degrees can be earned through a non-thesis option (Option B), while thesis options are available in EE, CPE, and CNE. The ECE Department offers all of the MS degrees online through [Engineering Online](#).

C. [PhD Degrees Offered](#)

1. Electrical Engineering (EE)
2. Computer Engineering (CPE)

II. Admission

A. Requirements

For general admissions requirements, refer to the Applications and Admissions section of the [Graduate School Handbook](#). For additional admissions requirements of the ECE Department, refer to the [ECE Graduate Admissions](#) website.

B. Types of Admission

Refer to the Graduate School Handbook section on [types of admission](#).

1. Full Graduate Standing

Most students are granted Full Admission by the Graduate School and enter NC State University in Full Graduate Standing.

2. Provisional Admission

Students may be granted Provisional Admission when they do not fully meet all of the necessary requirements for admission to the Graduate School, but their circumstances warrant Provisional Admission. The Graduate School will allow students to attain Full Graduate Standing after completing 9 or more graduate credit hours with a minimum GPA (grade point average) of 3.000. Courses taken for Credit Only (Satisfactory (S) or Unsatisfactory (U) grade) cannot be used as part of the minimum GPA. Please note that the ECE Department has stricter requirements and will allow students on Provisional status to attain Full Graduate Standing after completing 9 credit hours of graded ECE graduate level coursework with a minimum GPA of 3.333 and with grades that are B or above. Graduate students on Provisional status are not eligible to receive fellowship, teaching assistant, or research assistant appointments.

III. Financial Support

Financial Support for highly qualified students is available in the form of a fellowship, teaching assistantship, or research assistantship. All applicants are considered for these types of funding. Students supported on a salaried teaching assistantship, research assistantship or fellowship with a minimum annual stipend of at least \$8,000 (\$3,000 for fall or spring semester, \$1,000 for each summer session), who meet the minimum registration requirement, receive health insurance every semester and tuition for [a limited number of semesters](#) through the [Graduate Student Support Plan \(GSSP\)](#). Students on hourly assistantships do not receive GSSP. For general information on Financial Support, refer to the Financial Assistance section of the [Graduate School Handbook](#).

A. Fellowship

For information on university and national fellowship opportunities, refer to the Graduate School's [Fellowships and Grants](#) webpage.

To be eligible for a Fellowship:

1. Students must be admitted into the Graduate School in Full Graduate Standing.
2. Students are required by the ECE Department and the Graduate School to maintain an overall GPA of 3.000 or higher, unless granted an exception by the Graduate School.
3. Students should refer to the terms of the fellowship offer for specific information regarding fellowship requirements.

B. Teaching Assistantship

Teaching Assistant (TA) appointments are offered each academic semester to qualified graduate students. Students must be recommended by a faculty member. TA duties may include teaching laboratories or recitation sessions, grading, and other duties at the instructor's discretion.

To be eligible for a Teaching Assistant appointment:

1. Current students must apply for Teaching Assistant appointments via the TA Information Tab in the GradWatch portal. Students should update the Course Confidence Listing and complete the TA Application each semester they want to request a TA position. Current students will not be considered for a TA appointment if they have not applied for a TA position through GradWatch.

2. Students must be admitted into the Graduate School in Full Graduate Standing. Students must be enrolled full-time prior to [Census Date](#) and maintain their full-time enrollment status throughout the semester. For more information, refer to the Graduate School Handbook section on [Full-Time/Part-Time Registration](#).
3. Students must maintain an overall GPA of 3.333 or higher. Please note that the ECE Department requirement differs from the Graduate School requirement. The Graduate School requirement states that students must have an overall GPA of 3.000 or higher, unless granted an exception by the Graduate School.
4. Students must make satisfactory progress toward their degree, and perform satisfactorily in their assigned responsibilities. If a student terminates the program, if the cumulative GPA falls below 3.333 or if the department decides that the academic performance or work performance is unsatisfactory, the university may terminate the student's teaching assistantship.
5. All non-US citizen students (i.e., non-resident aliens and permanent residents) must demonstrate proficiency in English at a level necessary to be successful as a teaching assistant. Refer to the Graduate School's [English Proficiency Requirements for International Applicants](#) for more information. This requirement can be met in one of the following ways:
 - a) Be a citizen of a [country where English is the official language](#) **and** the language of instruction in higher education.
 - b) Have successfully completed at least one year of full-time study in a degree program at a four-year US college or university.
 - c) Provide a Test of English as a Foreign Language (TOEFL) Internet-based Test (iBT) score. The ECE Department requires a total score of **at least 90 points** and a Speaking score of **at least 26 points** for a TA appointment. Please note that the ECE Department requirement differs from the Graduate School requirement. The Graduate School requires a total score of at least 80 points and a Speaking score of 23 points for a TA appointment where the TA has direct verbal interactions with students or 26 points for a TA appointment where the TA presents lectures in the class or laboratory.
 - d) Provide an International English Language Testing System (IELTS) score. The ECE Department and Graduate School both require an Overall Band score of **at least 6.5 points** and a Speaking score of **at least 7.0 points** for a TA appointment.
 - e) If a student receives a TOEFL iBT Speaking Section score below 26, or an IELTS Speaking Section score below 7.0, then the [SPEAK Test](#) (Speaking Proficiency English Assessment Kit) is required. A student may only take the SPEAK test twice and those dates must be at least 5 months apart. Scores are valid for one year. A student must receive a score of at least 50 to be cleared for full teaching responsibilities. A student who receives a score of 45 may have limited teaching responsibilities, with a senior TA or a professor who has primary responsibility. A student who receives a score below 45 should be limited to TA responsibilities that do not involve explaining things to undergraduates, such as grading or supervising labs. The ECE Department requires students to receive a SPEAK Test **score of 45** to maintain a TA position after the first two academic semesters at NC State.

- f) **Students who receive a SPEAK Test score below 50** should sign up for FLE 400 and/or FLE 401 to improve their spoken English. This course will be taken for Credit Only (Satisfactory (S) or Unsatisfactory (U) grade) and will not count towards MS or PhD degree requirements. **Students who receive a SPEAK Test score of 35 or 40**, should expect to take at least 2 semesters of English instruction to reach a score of 50. It is recommended that students enroll in FLE 400 in the first semester, and enroll in FLE 401 the following semester. Students will be re-evaluated when they complete FLE 401. **Students who receive a SPEAK Test score of 45** should enroll in FLE 401. Students will be re-evaluated at the end of the semester. The ECE Department requires students to successfully complete FLE 401 and earn a 45 or greater on the pronunciation portion of the final exam to be eligible for a TA appointment.
6. All new Teaching Assistants (incoming students with TA appointments, and continuing students who have just been assigned their first TA appointment) are required to complete the College of Engineering Training for New Teaching Assistants at the beginning of Fall semester. To fulfill this training requirement new TAs must attend the Survival Skills for Graduate Students seminar, one additional seminar, and complete the NCSU Discrimination and Harassment Prevention and Response Training online. New Teaching Assistants will be contacted by the ECE Graduate Office at the beginning of each semester regarding these training details.

C. **Research Assistantship**

Research Assistant (RA) appointments are offered by faculty members. Most RAs are reserved for PhD students but some are available to MS students. Appointment times vary, and stipend amounts may differ depending on the student's qualifications and available funding. To learn more about research areas and the faculty members affiliated with each area, refer to the ECE Department [Research](#) webpage.

To be eligible for a Research Assistant appointment:

1. Current students must contact faculty members directly to discuss potential research projects and to request an RA position.
2. Students must be admitted into the Graduate School in Full Graduate Standing. Students must be enrolled full-time prior to [Census Date](#) and maintain their full-time enrollment status throughout the semester. For more information, refer to the Graduate School Handbook section on [Full-Time/Part-Time Registration](#).
3. Students are required by the ECE Department and the Graduate School to maintain an overall GPA of 3.000 or higher, unless granted an exception by the Graduate School.
4. Students must make satisfactory progress toward their degree, and perform satisfactorily in their assigned responsibilities. If a student terminates the program, if the overall GPA falls below 3.000 or if the department decides that the academic performance or work performance is unsatisfactory, the university may terminate the student's research assistantship.

IV. Advising

Academic Advisors are listed in GradWatch. Students should consult their academic advisor about selecting coursework, meeting degree requirements, changing their degree or program.

A. **Certificate Students**

The academic advisor will be the ECE Director of Graduate Programs (DGP)

B. MS Non-Thesis Students

MS EE and MS CPE students are advised by the ECE Assistant Director of Graduate Programs(ADGP).

MS [CNE](#) students are advised by the [ECE Program Coordinator](#) for CNE.

MS [EPSE](#) Students academic advisor are advised by the EPSE Program Director.

C. MS Thesis Students

Students are responsible for selecting an ECE graduate faculty member who will agree to serve as the academic advisor, committee chair and to direct thesis research. The ECE Department suggests that students take courses in the first semester, become familiar with the faculty, then approach a professor in the chosen area of interest to ask about possible research projects and their willingness to supervise research.

The [Advisory Committee](#) must consist of at least three graduate faculty members, one of whom serves as Chair of the committee. The committee should be formed by the end of the semester in which 18 credit hours have been completed towards the degree and is needed in order to submit a plan of work. If the advisor/chair becomes unable or unwilling to direct the work to completion and no suitable replacement is found, the student can pursue the MS Non-Thesis program option.

D. PhD Students

PhD students will be assigned an interim advisor upon acceptance into the doctoral program. Students may retain their interim advisor as their permanent academic advisor/committee chair or they may select an ECE graduate faculty member who will agree to serve as academic advisor, committee chair, and to direct dissertation research.

The [Advisory Committee](#) must consist of at least four graduate faculty members, one of whom serves as Chair of the committee. One committee member must be from a non-ECE Department (outside member). A Graduate School Representative (GSR) is required. Your outside member may serve as the GSR. It is the student's responsibility to select a GSR, though the Graduate School handbook notes that the Graduate School will appoint the GSR if one is not selected. The ECE Department will not submit Oral Exam Request paperwork to the Graduate School if a GSR has not been selected for the committee. If the student has declared a Minor, one of the committee members must be from the Minor program of study.

V. Certificate Requirements

In general, 12 credit hours of graduate-level courses completed for a letter grade are required for certificates in the ECE department. These courses can be completed onlinn or on-campus. The specific requirements for each certificate are outlined on the [Certificate Programs](#) section of the ECE graduate program web site. Currently enrolled students may obtain the certificate by submitting a [form](#) on the Graduate School website.

VI. Master of Science (MS) Degree Requirements

A. Master of Science Degree in Electrical Engineering (EE) or Computer Engineering (CPE)

All ECE requirements are in addition to the Graduate School's minimum degree requirements. Review the program requirements found in the Graduate School Handbook section on [minimum degree requirements](#). Relevant degree procedures and deadlines are listed in [Appendix A: ECE Degree Program Milestones](#).

[Graded courses](#) are 500 and 700 level courses in which letter grades, ranging from “A+” through “F” are given; they cannot be taken for “credit only.” [Credit Only courses](#) are 600 and 800 level courses in which a Satisfactory (S) or Unsatisfactory (U) grade is given.

All Master’s students enter the program as [Option B \(non-thesis\)](#) students.

1. Minimum Degree Requirements:

- a) The MS Plan of Work for CNE, CPE and EE must have at least 31 credit hours, while the MS plan of Work for EPSE must have at least 30 credit hours.
- b) Enroll in ECE 600: ECE Graduate Orientation in the first semester. This is a mandatory 1 credit hour course for all graduate students enrolled in the CNE, CPE and EE programs.
- c) Maintain an overall GPA of 3.000 as well as a Major GPA of 3.000 (the Major GPA is calculated from grades in all ECE courses, including ECE courses cross-listed with other departments).
- d) Complete at least 21 credit hours of ECE courses: at least 18 credit hours must be graded and 3 credit hours of 600 level courses may be taken for credit only (S/U). These must be NC State or [inter-institutional courses](#). ECE courses that are cross-listed with other departments will count as ECE courses.
- e) For MS non-thesis (Option B) students, a maximum of three credit hours of ECE 633, 634, or 650 may be taken for credit only (S/U) and included on the [Option B Plan of Work](#). ECE 695 cannot be included on the Option B Plan of Work.
- f) For MS thesis students, a maximum of nine credit hours may be taken for credit only (S/U) and included on the Plan of Work: three credit hours of ECE 633 or 634 and six credit hours of ECE 695.

2. Plan of Work Requirements:

All ECE courses are assigned to a major (either EE or CPE). Most ECE courses are associated with a specialty area. ECE course details with this information can be found in [Appendices B, C, and D](#). The department requires the following to be included in the Plan of Work:

- a) Major: Five courses must be in the student’s major (EE or CPE). The courses with an EE/CPE designation can count towards either major.
- b) Depth: One 700-level ECE course (minimum of three credit hours) must be in the student’s major (EE or CPE). This requirement *cannot* be met with *non-ECE* 700-level courses.
- c) Breadth: Three ECE courses(EE or CPE), each in a [different specialty area](#)(e.g. Circuits, Networking, VLSI Systems, etc).

Note: One course can meet multiple requirements.

3. Non-ECE Courses:

A maximum of 9 credit hours of non-ECE courses may be included in the Plan of Work. Approval from the academic advisor should be obtained before enrolling in non-ECE courses. Of these nine credit hours, a maximum of three credit hours may be 400 level, while the remaining credit hours must be graduate non-ECE courses (500 or 700 level). The courses should be in a related technical area and follow these guidelines:

- a) Graduate level courses in CSC, EGR, MA, STAT, PHYS, CH, or any other engineering department.
- b) MBA and BUS courses that are listed for the [CNE program](#).

4. Thesis Option

All Master's students enter the program as Option B (non-thesis) students. To change to MS-Thesis:

- a) Select a faculty member to oversee MS research and serve as Committee Chair.
- b) Contact the ECE Graduate Office, who will change the student's plan from Non-Thesis (Option B) to the Thesis option.
- c) Enter the Chair and Advisory Committee in the Graduate Plan of Work in [MyPack Portal](#). Read the Graduate School Handbook section on [Advisory Committees](#) for complete details regarding committee requirements.

Master's students electing the thesis option must write a master's thesis and complete a Final Oral Examination conducted by the student's Graduate Advisory Committee. Unanimous approval by the Advisory Committee is required to pass the Final Examination. For full details on Final Oral Examination and thesis requirements, read the Graduate School Handbook sections on [comprehensive examinations](#) and [Theses and Dissertations](#).

B. Master of Science Degree in Computer Networking (CNE)

Refer to the [ECE Computer Networking website](#) for program information and requirements.

C. Master of Science Degree in Electric Power Systems Engineering (EPSE)

Refer to the [ECE Electric Power Systems Engineering website](#) for program information and requirements.

D. Plan of Work

All graduate students submit the Formal Graduate Plan of Work electronically through the [MyPack Portal](#) (Main Menu --> Student Self Service --> Academic Records --> Graduate Plan of Work). Read the Graduate School Handbook section on [Plan of Work guidelines](#) before filling in the Plan of Work. The Student Information Systems [SIS Training Manual](#) is also very helpful in explaining this process. Refer to the Graduate School Handbook section on [Advisory Committees](#) for complete details regarding committee requirements. A worksheet to help students determine how their coursework meets degree requirements can be found in [Appendix E](#).

1. Non-Thesis MS ([Option B Master's Degree](#))

- a) A formal Plan of Graduate Work must be submitted via [MyPack Portal](#) before the end of the second semester's enrollment or completion of 18 credit hours.
- b) The student's academic advisor will serve as the Plan of Work Committee Chair. MS EE and CPE students are advised by the ADGP. MS [CNE](#) students are advised by the ECE Department Masters in Computer Networking [Program Coordinator](#).
- c) The final Plan of Work must be approved by the Committee Chair, the Assistant Director of Graduate Programs and the Director of Graduate Programs before being approved by the Dean of the Graduate School.

2. Thesis MS

- a) A formal Plan of Graduate Work must be submitted via [MyPack Portal](#) before the end of the second semester's enrollment or completion of 18 credit hours.
- b) MS thesis students must form a Graduate Advisory Committee by the end of the semester in which 18 or more credits have been completed toward the degree. To form a committee, consult the Graduate School Handbook section on [Advisory Committees](#).
- c) The final Plan of Work must be approved by each member of the Advisory Committee and the Director of the Graduate Programs before being approved by the Dean of the Graduate School.

VII. Doctor of Philosophy (PhD) Degree Requirements

All ECE requirements are in addition to the Graduate School's minimum degree requirements. Review the program requirements found in the Graduate School Handbook section on [minimum degree requirements](#). Relevant degree procedures and deadlines are listed in [Appendix A: ECE Degree Program Milestones](#).

[Graded courses](#) are 500 or 700 level courses in which letter grades, ranging from "A+" through "F" are given; they cannot be taken for "credit only." [Credit Only courses](#) are 600 and 800 level courses in which a Satisfactory (S) or Unsatisfactory (U) grade is given.

A. Minimum Degree Requirements

1. The PhD Plan of Work must have at least 72 credit hours, including MS credit hours.
2. Enroll in ECE 600: ECE Graduate Orientation in the first semester. This is a mandatory 1 credit hour course for all graduate students enrolled in the CPE and EE programs.
3. Maintain an overall GPA of 3.000 as well as a Major GPA of 3.000 (the Major GPA is calculated from grades in all ECE courses, including ECE courses cross-listed with other departments).
4. For PhD students with only a BS degree:
 - a) A minimum of 30 graded credit hours must be completed at NCSU.
 - b) A minimum of 18 graded credit hours of ECE courses must be completed at NCSU.
5. For PhD students with an NCSU MS degree in EE, CPE, CPSE, or CNE:

With continuous enrollment: Graded courses from the MS degree meet PhD graded course requirements and can be included on the PhD plan of work.

Without continuous enrollment: A maximum of 18 graded credit hours from the MS degree can be included on the PhD plan of work and there are no other PhD graded course requirements. With approval from your committee, no other graded credit hours are needed.
6. For PhD students with an NCSU MS degree in a non-ECE department:

With continuous enrollment: Graded courses from the MS degree meet PhD graded course requirements and can be included on the PhD plan of work.

 - a) A minimum of 30 graded credit hours must be completed at NCSU.

b) A minimum of 6 graded credit hours of ECE courses must be completed at NCSU.

Without continuous enrollment: A maximum of 18 graded credit hours from the MS degree can be included on the PhD plan of work and a minimum of 6 graded credit hours of ECE courses must be completed at NCSU. With approval from your committee, no other graded credit hours are needed.

7. For PhD students with a Non-NCSU MS degree:

a) A maximum of 18 credit hours from the previous MS degree can be included in the PhD Plan of Work.

b) A minimum of 12 graded credit hours must be completed at NCSU.

c) A minimum of 6 graded credit hours of ECE courses must be completed at NCSU.

B. Plan of Work Requirements

All ECE courses are assigned to a major (either EE or CPE). Most ECE courses are associated with a specialty. ECE course details with this information can be found in Appendices B,C, and D. The department requires the following to be included in the Plan of Work:

1. **Depth:** Two 700-level ECE courses (minimum of six credit hours) must be taken. At least one of these 700-level courses must be in the student's major (EE or CPE). This requirement *cannot* be met with *non-ECE* 700-level courses.
2. **Research Credits:** ECE 833, 834, and 895 may be taken for credit only (S/U) and included on the Plan of Work. ECE 896 and 899 cannot be included on the Plan of Work.
3. Total graded course requirements are subject to approval of the PhD advisor, who can require courses beyond the minimum requirements listed.

C. Plan of Work

All graduate students submit the Formal Graduate Plan of Work electronically through the [MyPack Portal](#) (Main Menu --> Student Self Service --> Academic Records --> Graduate Plan of Work). Read the Graduate School Handbook section on [Plan of Work guidelines](#) before filling in the Plan of Work. The Student Information Systems [SIS Training Manual](#) is also very helpful in explaining this process. A worksheet to help students determine how their coursework meets degree requirements can be found in Appendix E.

1. A formal Plan of Graduate Work must be submitted via MyPack Portal before the end of the fourth semester's enrollment as a doctoral student.
2. PhD students must form a Graduate Advisory Committee by the end of the fourth semester's enrollment as a doctoral student. Each student's PhD program is individually planned with the help of an advisory committee of graduate faculty members, chosen by the student to provide a perspective on all areas of advanced knowledge in a particular field of study. To form a committee, consult the Graduate School Handbook section on [Advisory Committees](#).
3. The final Plan of Work must be approved by each member of the Advisory Committee and the Director of the Graduate Programs before being approved by the Dean of the Graduate School.

D. Qualifying Review Exam

The student's Qualifying Review Committee will decide the exact nature of the Qualifying Review. The Qualifying Review may have many forms amongst research areas; however, it must have both oral and written components. The student must be enrolled in the Qualifying Review course (ECE 834) during the semester in which the Qualifying Review takes place.

1. Timing of the Qualifying Review Exam:

a) PhD student with a previous Master's degree:

Students who enter the PhD program with a previous MS degree must take the Qualifying Review no later than the third semester of PhD enrollment.

b) PhD student without a previous Master's degree:

Students who enter the PhD program without a previous MS degree may delay the Qualifying Review to the fourth semester of PhD enrollment. This must be approved by the student's Qualifying Review Committee.

2. The purpose of the Qualifying Review Exam is to evaluate:

- The student's breadth of knowledge by their performance in at least three graduate level courses that are outside the student's specialty area.
- The in-depth knowledge of the student in their area of interest.
- The suitability of the student to perform competent research.

3. Outcomes of the Qualifying Review Exam:

At the conclusion of the Qualifying Review, the committee will recommend, by majority vote, for or against allowing the student to continue in the PhD program.

• Unconditional Pass:

Students who receive an Unconditional Pass will be allowed to continue in the PhD program.

• Conditional Pass:

Students who receive a Conditional Pass will be allowed to continue in the PhD program, but will need to retake the Qualifying Review. The Advisory Committee will note conditions that need to be met by the student and a timeline for meeting these conditions.

• Fail:

Students who fail to obtain a majority recommendation to continue in the PhD program will Fail the Qualifying Review and can attempt the exam one more time. If the student fails the second time, they will be asked to withdraw from the PhD program at the end of the current semester. Failure to withdraw may result in [Termination of Graduate Status](#). Students will not be allowed to remain in the PhD program unless they receive an Unconditional or Conditional Pass.

Students in good academic standing who do not have a previous Master's degree in EE, CPE, or a closely related major may apply to transfer to the Master's program for a terminal Master's degree in EE or CPE. Students in good academic standing who have a previous Master's degree in EE, CPE, or a closely related major may apply for a graduate degree in another academic department.

E. Preliminary Oral Examination

Each PhD student is required to Unconditionally Pass a Preliminary Examination conducted by the student's Graduate Advisory Committee. A doctoral student is admitted to candidacy by the Graduate School upon passing the preliminary examination without conditions or after fulfilling any conditions specified by the advisory committee. The Advisory Committee will determine the requirements for the Preliminary Examination and any re-examinations.

For full details on what is required for a Preliminary Examination, read the Graduate School Handbook section on [comprehensive examinations](#). Read the Graduate School Handbook section on [Advisory Committees](#) for complete details regarding committee requirements.

1. Timing of the Preliminary Examination:

The Qualifying Review Exam must be passed Unconditionally before the student can take the Preliminary Examination. It cannot be held earlier than the end of the second year of graduate study and it is recommended that it be held at least one calendar year before the Final Oral Examination. Students must submit their Plan of Work through the MyPack Portal before scheduling their Preliminary Oral Examination.

2. The purpose of the Preliminary Examination is to evaluate the student's ability to:

- relate factual knowledge to specific circumstances
- apply this knowledge with accuracy and promptness
- demonstrate a comprehensive understanding of the field of specialization and related areas

3. Outcomes of the Preliminary Examination:

At the conclusion of the Preliminary Examination, the committee will recommend, by majority vote, for or against allowing the student to continue in the PhD program.

- Unconditional Pass:

Students who receive an Unconditional Pass will advance to doctoral candidacy and will be allowed to continue in the PhD program.

- Conditional Pass:

Students who receive a Conditional Pass will be allowed to continue in the PhD program. The Advisory Committee will note conditions that need to be met by the student and a timeline for meeting these conditions. In the event a re-examination is needed, at least one full semester (4 calendar months) must pass before a re-examination is held.

When all conditions have been met, it is the responsibility of the Committee Chair to notify the ECE Graduate Office that the student has met the conditions to receive an Unconditional Pass. The ECE Graduate Office will notify the Graduate School that the conditions have been met and the student will then advance to doctoral candidacy.

- Fail:

Students who fail to obtain a majority recommendation to continue in the PhD program will Fail the Preliminary Examination and can attempt the exam one more time. If the student fails the second time, they will be asked to withdraw from the PhD program at the end of the current semester. Failure to withdraw may result in [Termination of Graduate Status](#). Students will not be allowed to remain in the PhD program unless they receive an Unconditional or Conditional Pass.

Students in good academic standing who do not have a previous Master's degree in EE, CPE, or a closely related major may apply to transfer to the Master's program for a terminal Master's degree in EE or CPE. Students in good academic standing who have a previous Master's degree in EE, CPE, or a closely related major may apply for a graduate degree in another academic department.

F. Final Oral Examination

PhD students must write a dissertation and complete a Final Oral Examination conducted by the student's Graduate Advisory Committee. Unanimous approval by the Advisory Committee is required to pass the Final Examination. Students must Unconditionally Pass the Preliminary Examination before they can take the Final Examination.

For full details on Final Oral Examination and dissertation requirements, refer to the Graduate School Handbook sections on [comprehensive examinations](#) and [Theses and Dissertations](#). Read the Graduate School Handbook section on [Advisory Committees](#) for complete details regarding committee requirements.

1. Timing of the Final Examination:

The dissertation must be completed and copies must be distributed to the Advisory Committee before the exam is scheduled. The exam must be scheduled with the ECE Graduate Office at least three weeks before the exam date. It is recommended that the Final Examination be scheduled at least one calendar year after receiving an Unconditional Pass on the Preliminary Examination.

2. The purpose of the Final Examination is for:

- the candidate to present the methodology used, the data collected, and the conclusions reached as reported in the dissertation
- the Advisory Committee to question the candidate about their dissertation research

3. Outcomes of the Final Examination:

At the conclusion of the Final Examination, the committee will recommend, by majority vote, for or against allowing the student to graduate from the PhD program.

- **Unconditional Pass:**

Students who receive an Unconditional Pass will be allowed to graduate from the PhD program, pending electronic submission and approval of their dissertation.

- **Conditional Pass:**

Students who receive a Conditional Pass will be allowed to continue in the PhD program. The Advisory Committee will note conditions that need to be met by the student and a timeline for meeting these conditions. In the event a re-examination is needed, at least one full semester (4 calendar months) must pass before a re-examination is held.

When all conditions have been met, it is the responsibility of the Committee Chair to notify the ECE Graduate Office that the student has met the conditions to receive an Unconditional Pass. The ECE Graduate Office will notify the Graduate School that the conditions have been met and the student will then be allowed to graduate from the PhD program, pending electronic submission and approval of their dissertation.

- **Fail:**

Students who fail to obtain a majority recommendation to graduate from the PhD program will Fail the Final Examination and can attempt the exam one more time. If the

student fails the second time, they will be asked to withdraw from the PhD program at the end of the current semester. Failure to withdraw may result in [Termination of Graduate Status](#). Students will not be allowed to graduate from the PhD program unless they receive an Unconditional or Conditional Pass.

Students in good academic standing who do not have a previous Master's degree in EE, CPE, or a closely related major may apply to transfer to the Master's program for a terminal Master's degree in EE or CPE. Students in good academic standing who have a previous Master's degree in EE, CPE, or a closely related major may apply for a graduate degree in another academic department.

VIII. Degree Changes and Additions

A. Adding a Minor

Refer to the Graduate School Handbook section on [minors](#) and the Graduate School Catalog list of [minors](#). MS Non-Thesis (Option B) students are not permitted to earn a minor. The minor work should be from a single discipline or field that in the judgment of the advisory committee provides relevant support to the major field.

The minor must be declared on the Plan of Work. One member of the Advisory Committee must be from the minor field. The minor credits on the Plan of Work must be approved by the advisory committee member overseeing the minor and the minor program Director of Graduate Programs. A minimum of 9 credit hours is required for the minor, upon approval of the advisory committee member overseeing the minor.

B. Adding a Co-major

Refer to the Graduate School Handbook section on [co-majors](#). MS Non-Thesis (Option B) students are not permitted to co-major. The co-major must be declared on the Plan of Work and approval must be obtained from both programs. All requirements for both majors must be met. For MS thesis students, a representative from each program must be included on the advisory committee. For PhD students, the representatives from each program should be co-chairs on the advisory committee. One degree is awarded and the co-major is noted on the transcript.

C. Changing or Adding a Degree or Level

After completing one semester (or more) of graduate study and remaining in good academic standing, students may decide to change their major or level. To initiate this process, the student should complete the Change of Degree Status or Curriculum form. All graduate students complete the Change of Degree Status or Curriculum Form through the [MyPack Portal](#) (Main Menu --> Student Self Service --> Academic Records --> Grad Curriculum Change Form). The form will have two options:

- a) [Change an academic plan](#) – this is selected for a change in major or level and will remove the student from their current plan.
- b) [Add an academic plan](#) – this is selected if the student will remain in their current plan and will add another academic plan
- c) [Delete an academic plan](#) – this is selected if the student would like to remove an academic plan

International graduate students will also need to complete the OIS Change in Curriculum/Change in Level Request form, which is available on the [OIS Forms for Current International Students](#) webpage.

The Change in Curriculum forms must be approved by the Director of Graduate Programs and by the Dean of the Graduate School.

Below are additional guidelines for common changes:

1. En-Route Master's (MS) Degree

Students in the PhD program may also receive their MS degree after meeting the MS degree requirements. On the Change of Degree Status or Curriculum Form, students would choose to add an MS plan to their current PhD plan. Once this form has been approved, students would then need to submit a Plan of Work for the MS degree and apply to graduate with their MS degree.

2. Multiple Master's Degrees

Students who would like to pursue multiple Master's degrees at NC State University, should consult the Graduate School Handbook section on [awarding multiple master's degrees](#). The Graduate School Handbook notes that no more than 12 credit hours may be used to satisfy degree requirements for another master's degree program at NC State, unless the student did not complete the other program. On the Change of Degree Status or Curriculum Form, students would choose to add an MS plan to their current MS plan.

3. Change of Major

Students who choose to change their major (EE or CPE) to another should contact their academic advisor for approval. Students changing to or from MS-EPSE must obtain approval from the EPSE Program Director. On the Change of Degree Status or Curriculum Form, students would choose to change their current plan to a different plan.

4. Change of Level

a) Master of Science (MS) Application to Doctor of Philosophy (PhD) Degree

Students in the MS program with an overall GPA of 3.25 or above are encouraged to consider continuing onto the PhD program after the completion of their MS degree, with the support of a research advisor. The [Application for Admission to the PhD Program from NCSU MS form](#) must be signed by a potential PhD faculty research advisor and by one additional ECE graduate faculty member who supports the application to apply to our PhD program. On the Change of Degree Status or Curriculum Form, students would choose to add a PhD plan to their current MS plan.

b) Doctor of Philosophy (PhD) Degree to Master of Science (MS) Degree

Students who would like to change from the PhD degree to the MS degree should make an appointment to meet with the DGP or ADGP to discuss this decision. Approval from the DGP or ADGP and the student's research advisor is needed for this change of level. On the Change of Degree Status or Curriculum Form, students would choose to change from their current PhD plan to an MS plan.

Students in good academic standing who do not have a previous Master's degree in EE, CPE, or a closely related major may apply to transfer to the Master's program for a terminal Master's degree in EE or CPE. Students in good academic standing who have a previous Master's degree in EE, CPE, or a closely related major may apply for a graduate degree in another academic department.

IX. Enrollment and Registration Requirements

A. Course Load Policy

The ECE Department's maximum course load for graduate students is 13 credit hours in a semester and 6 credit hours in a summer session for full-time students not holding assistantships. Please note that the ECE Department's maximum course load is lower than the university's maximum course load. The [university's maximum course load](#) for graduate students is 15 credit hours in a semester and 6 credit hours in a summer session for full-time students not holding assistantships.

B. Continuous Enrollment

Continuous enrollment is required. After students are admitted and enroll for the first time, they are required to maintain continuous registration, i.e., be enrolled each semester, excluding summer sessions, until they have either graduated or their graduate program at NC State University has been terminated.

Graduate students whose programs have been terminated because of failure to maintain continuous registration and who have not been granted a leave of absence during a fall or spring semester will be required to [reapply for admission](#) and pay the admission fee, if they wish to resume their graduate studies at NC State.

The requirements are explained in the [minimum registration and residence requirements](#) section of the Graduate School Handbook.

C. Leave of Absence

A student in good academic standing who must interrupt his graduate program for good reasons may request a [leave of absence](#).

- a) The leave of absence may not exceed one year (two academic semesters).
- b) The student must complete the [Leave of Absence Request Form](#), and obtain approval from the Advisory Committee Chair and the Director of Graduate Programs. The Graduate School should receive the Leave of Absence Request from the ECE Graduate Office at least one month prior to the first day of the term requested for the leave.

D. Withdrawal

Refer to the policies on [Official Withdrawal from the university](#) for more information on program termination. Students considering withdrawal should consult their advisor and DGP.

If a student would like to withdraw during a semester, and return the following semester, the student will need to proceed must go through the official withdrawal process which can be found at **MyPack Portal: Student Self Service > Enrollment > Term Withdrawal**

If a student would like to withdraw during a semester, and return later than the following semester, the student will also need to submit a [Leave of Absence Request form](#) to the ECE Graduate Office.

If a student would like to permanently withdraw from the University, a [Termination form](#) will also need to be completed.

E. Full-Time, Half-Time and Part-Time Registration Requirements

The university's requirements for full-time, half-time and part-time registration apply to Fall and Spring academic semesters. Refer to the Graduate School handbook section on [Registration Requirements](#) for more information.

1. PhD and MS Thesis Students

a) Fall and Spring Semester Full Time Enrollment:

Students will be enrolled full time if they enroll in at least 9 credit hours per semester until the semester in which a course load of at least 3 credit hours will reach an accumulated total equal to the minimum number of hours required by their degree program. Students will continue to be considered full time until they complete their thesis or dissertation, as long as they enroll for at least 3 credit hours each semester. Credit hours of a course that is taken for audit do not count towards enrollment.

b) Half Time Enrollment:

A graduate student in a plan requiring a thesis or dissertation who fails to maintain full-time status in any given term will be subject to the requirements governing students in the non thesis plan in order to be certified as Half Time.

c) Summer Enrollment for Graduates

Students who will graduate in Summer or Fall (No Registration Required) must enroll in 1 credit hour of ECE 696 (Summer Thesis Research) or ECE 896 (Summer Dissertation Research) during Summer session. Refer to the Graduate School [Continuous Enrollment Policy](#) for more information.

d) No Registration Required Graduation

Students who will graduate in Fall or Spring semester with "No Registration Required" must enroll in the immediately preceding semester or summer session. Refer to the Graduate School [ETD Deadlines](#) and [Continuous Enrollment Policy](#) for more information.

e) Incomplete (IN) Grades after all Requirements have been met:

Students are not required to enroll if their only remaining requirement for graduation is the removal of an IN grade. However, students who do not remove remaining IN grades in the semester or summer following the completion of all other degree requirements will be terminated at the end of that semester or summer due to non-compliance with the continuous enrollment policy.

2. MS Non-Thesis Students

a) Full Time Enrollment:

Students will be enrolled full time if they enroll in at least 9 credit hours per semester. In the student's last semester, a course load of less than 9 credit hours can be considered full-time enrollment, if the accumulated total equals the minimum number of hours required by their degree program. For a course load of less than 9 credit hours, a waiver of the uniform academic load rules requires attestation on

behalf of the student by the director of their graduate program and approval by the university. Credit hours of a course that is taken for audit do not count towards enrollment.

b) Half Time Enrollment:

Students will be enrolled half time if they take at least 4.5 credit hours per semester. Credit hours of a course that is taken for audit do not count towards enrollment.

3. Co-op Students

Co-op students registered for COP 500 will be considered full time. Students registered for only COP 501 will be considered half time.

F. Enrollment in Individual Studies and Research Credit Courses

[Individual Studies and Individual Topics courses](#) may be taken to satisfy university and departmental credit requirements. Students may not enroll themselves in these courses, as the courses require instructor and departmental approval. Students should submit the [Enrollment Request form](#), with the instructor approval and signature, to the ECE Graduate Office for enrollment in these courses.

ECE 633: Individual Topics in Electrical Engineering

This course should be taken by a master's student working with a professor on a topic or on research that is not the student's master's thesis research.

ECE 634: Individual Studies in Electrical Engineering

This course is for one professor working with several students on a designated project.

ECE 695: Master's Thesis Research

This course should be taken by a master's thesis student working with a professor on master's thesis research in Fall or Spring semester.

ECE 696: Master's Thesis Research – Summer Session Only

This course should be taken by a master's thesis student working with a professor on master's thesis research in Summer semester. Students who plan to graduate in Summer semester or in Fall semester (No Registration Required) must enroll in this course.

ECE 699: Master's Thesis Preparation

This course should be taken by a master's thesis student who has completed his thesis research and is preparing and writing his thesis. Enrollment in this course is only allowed once, in the final semester only. This course cannot be included in the Graduate Plan of Work.

ECE 833: Individual Topics in Electrical Engineering

This course should be taken by a PhD student working with a professor on a topic or on research that is not the student's PhD dissertation research.

ECE 834: Individual Studies in Electrical Engineering (Qualifying Review)

This course should be taken in the semester in which the student plans to complete the PhD Qualifying Review Exam. Students must confirm with their research advisor and group which professor should supervise their enrollment in ECE 834.

ECE 895: Doctoral Dissertation Research

This course should be taken by a PhD student working with a professor on PhD dissertation research in Fall or Spring semester.

ECE 896: Doctoral Dissertation Research – Summer Session Only

This course should be taken by a PhD student working with a professor on PhD dissertation research in Summer semester. Students who plan to graduate in Summer semester or in Fall semester (No Registration Required) must enroll in this course.

ECE 899: Doctoral Dissertation Preparation

This course should be taken by a PhD student who has completed his dissertation research and is preparing and writing his dissertation. Enrollment in this course is only allowed once, in the final semester only. This course cannot be included in the Graduate Plan of Work.

X. Transfer of Credits:

Refer to the Graduate School's guidelines for transfer credits in section D of the [Graduate School minimum requirements](#) section of the Graduate School Handbook for more information. Students must submit the Graduate School [Transfer Credit form](#), an official transcript from the college or university where the course(s) were taken, and a copy of the course syllabus for each course at the time it was taken to the ECE Graduate Office for approval from the Director of Graduate Programs. A maximum of 12 credit hours with a grade of B or above may be transferred into a master's degree program.

Transfer credit hours may be:

- a) graduate credits earned at another university, that were not taken as part of a previous degree program
- b) graduate credits earned while enrolled in an undergraduate program at NCSU, that were not counted toward fulfillment of undergraduate requirements
- c) graduate credits earned while enrolled in a previous graduate degree program at NCSU, that were not taken as part of a previous degree program
- d) graduate credits earned at NCSU through the Non-Degree Studies (NDS) or Post-Baccalaureate Studies (PBS) programs

Transfer credits or credits from extension courses from other universities are not acceptable for credit toward the PhD degree.

[Inter-Institutional Courses](#) can count towards the minimum degree requirements.

XI. Academic Difficulty –

Students are required to maintain a graduate GPA of at least 3.000. A GPA of at least 3.000 for all graduate course work at NC State is required for graduation. Refer to the Graduate School Handbook section on [Academic Difficulty](#).

A. Academic Warning

Graduate students are given a notice of academic warning if they have accumulated 18 or fewer credit hours at the 400 level or above and have a GPA below 3.000. Students on academic warning may continue to hold an assistantship or fellowship and receive financial aid if granted an exception by the Graduate School.

B. Academic Probation

Graduate students will be placed on academic probation if they have accumulated more than 18 credit hours at the 400 level or above and have a GPA in the range of 2.667 to 2.999. Students placed on academic probation will be ineligible for financial aid or appointment or reappointment to an assistantship or fellowship.

C. Termination

Graduate students will be terminated if they have accumulated more than 18 credit hours at the 400 level or above and have a GPA below 2.667, or if they have accumulated 30 or more credit hours and have a GPA below 3.000. In cases of program termination, no further registration in a graduate classification will be permitted.

A student may be terminated for violation of the NC State Code of Student Conduct.

A student may be terminated upon recommendation by the department if the student is not making satisfactory progress toward the degree as determined by departmental guidelines.

Graduate students may be terminated from the program at any time if, in the judgment of the degree-granting Department and the Graduate School, a student fails to make satisfactory progress towards the completion of the degree (regardless of grades). Examples of unsatisfactory progress may include, but are not limited to, inadequate grade point average, inadequate research and/or research skills, failure to obtain satisfactory grades in required courses for the program, or failing the candidacy, comprehensive, or final oral examination.

D. Reinstatement

Under extenuating circumstances, the Director of Graduate Programs may recommend and provide justification to the Dean of the Graduate School to reinstate a student's graduate classification. This recommendation must be in writing and must be signed and approved by the advisory committee and the DGP or the Department Head before the Graduate Dean will consider it. It should include a reasonable schedule for achieving the 3.000 GPA average.

Students who also need to have their assistantships or fellowships reinstated should ask their DGP to submit an assistantship/fellowship reinstatement request to the Graduate School along with the academic reinstatement request. Refer to the Graduate School's [RA and TA Appointments](#) webpage for more information.

XII. Graduation

A. Apply to Graduate

An application to graduate must be submitted by each student who plans to graduate in a specific academic term. Degrees are conferred by NC State University at the end of the fall and spring semesters and at the end of the second summer session. See the Student Information Systems [SIS Training Manual](#) for instructions on how to submit the application to graduate in [MyPack Portal](#). Refer to the Graduate School [academic calendar](#) and [ETD website](#) for information about Apply to Graduate deadlines.

The following items must be completed to ensure that a student is able to graduate in a given graduation semester:

1. MS Non-Thesis students:
 - a) Sign the Patent Agreement and resolve any Incomplete (IN) grades with the course instructor. Finalize and submit the Plan of Work and Advisory Committee via the MyPack Portal for advisory committee chair and DGP approval. The Plan of Work must be approved before a student will be cleared to graduate.
 - b) Apply to Graduate through MyPack Portal by the Graduate School's deadline.
2. PhD and MS Thesis students:
 - a) Sign the Patent Agreement and resolve any Incomplete (IN) grades with the course instructor. Finalize and submit the Plan of Work and Advisory Committee through MyPack Portal for advisory committee member, advisory committee chair and DGP approval. The Plan of Work must be approved before scheduling the Final Oral Examination.
 - b) Apply to Graduate through the MyPack Portal by the Graduate School's deadline.
 - c) Complete the thesis or dissertation and distribute preliminary copies to the Advisory Committee members. Schedule the Final Oral Examination in consultation with the Advisory Committee and confirm the date, time, and location of the exam. Submit the Request to Schedule Oral Examination form to the ECE Graduate Office at least three weeks before the exam date.
 - d) After a student receives an Unconditional Pass on the Final Examination, a pdf file of the Electronic Thesis & Dissertation (ETD) review copy of the thesis or dissertation must be submitted to the Graduate School ETD Submission System. This must be done within 24 hours of receiving an Unconditional Pass on the Final Oral Examination or within 24 hours of satisfying the conditions of a Conditional Pass.
 - e) The Final Error-Free ETD copy of the thesis or dissertation must be submitted to the Graduate School by the deadline given in the academic calendar and must conform to the Electronic Thesis & Dissertation (ETD) Guide. The Advisory Committee must give final approval by the designated Graduate School deadline.

B. Causes for Denial or Delay of Application to Graduate

The ECE Department and Graduate School will not clear a student to graduate until all degree requirements have been met. The following can occur to delay graduation approval or the receipt of a diploma:

1. **Pending or Denied Plan of Work:** The Advisory Committee Members must have accepted their roles on the committee. The student's Plan of Work must be approved by all Advisory Committee members and the Director of Graduate Programs.
2. **Incomplete (IN) or Late (LA) grade:** All IN and LA grades must be changed by the course instructor when requirements are met. Students will not be approved to graduate if any IN or LA grades are on the transcript.
3. **Financial holds set by the Cashier's Office:** Students will not receive a diploma or an official transcript from the University until any outstanding bills have been paid and the hold has been cleared.

C. Withdraw an Application to Graduate

MyPack Portal does not allow a student to withdraw a graduation application once it has been submitted. Only the ECE Graduate Office staff can withdraw an application to graduate. To withdraw an application to graduate, email the ECE Graduate Office at ecegradoffice@ncsu.edu with justification to request that the application to graduate be withdrawn.

D. Graduation Ceremony

Degrees are conferred by NC State University at the end of the fall and spring semesters and at the end of the second summer session. Formal commencement exercises are held at the end of the fall and spring semesters, but any student who graduated the preceding second summer session is eligible to participate in the fall commencement exercises.

The ECE Department Graduation and University Commencement Ceremonies are held at the end of the the fall and spring semesters. Students are expected to attend the ceremonies in the semester in which they graduate; summer and fall graduates attend the fall ceremonies in December, and spring graduates attend the spring ceremonies in May. The Registration & Records website contains [information on all graduation ceremonies](#).

Graduates may not defer walking in the University Commencement Ceremony, but may defer walking in the ECE Department Graduation Ceremony by one semester.

Diplomas are issued by the Registration and Records department and will be mailed to the address listed as your Diploma or Home/Mailing address in your [MyPack Portal](#). For information on the graduation process, diploma distribution and degree posting refer to the Registration and Records [graduation website](#).

Appendix A: ECE Degree Program Milestones

(Graduate School Deadlines can be found on the [Academic Calendar](#))

MS Non-Thesis Milestones

- Before the beginning of the first semester of enrollment, submit complete, official transcripts for each college or university attended to the Graduate School. Transcripts must include all courses completed and the degrees and dates awarded.
- After completing 18 credit hours, submit the Plan of Work in the [MyPackPortal](#). If changes need to be made to the Plan of Work, contact the ECE Graduate Office to request that they reset the Plan of Work.
- During the last semester, Apply to Graduate in the [MyPackPortal](#) before the Graduate School's [deadline](#). The Plan of Work must be submitted before applying to graduate.

MS Thesis Milestones

- Before the beginning of the first semester of enrollment, submit complete, official transcripts for each college or university attended to the Graduate School. Transcripts must include all courses completed and the degrees and dates awarded.
- After completing 18 credit hours, submit the Plan of Work in the [MyPackPortal](#). If changes need to be made to the Plan of Work, contact the ECE Graduate Office to request that they reset the Plan of Work.
- Before the end of the first year, attend an Electronic Thesis and Dissertation (ETD) workshop. Refer to these links for [Workshops & Seminars Information](#) and [ETD Workshop Registration](#).
- At least 3 weeks before the Master's Oral Examination date, submit the Request to Schedule the Master's Oral Examination form to the ECE Graduate Office.
- After the Master's Oral Examination has been scheduled, Apply to Graduate in the [MyPackPortal](#) before the Graduate School's [deadline](#). The Plan of Work must be submitted before applying to graduate.
- Within 24 hours of receiving an Unconditional Pass on the Master's Oral Examination, submit the ETD Review copy of the thesis to the Graduate School through their ETD submission website.
- At least one month before graduation, submit the Final Error-Free ETD copy of the thesis to the Graduate School through their ETD submission website before their [deadline](#).

PhD Milestones

- Before the beginning of the first semester of enrollment, submit complete, official transcripts for each college or university attended to the Graduate School. Transcripts must include all courses completed and the degrees and dates awarded.
- Plan to take the Qualifying Review Exam and enroll in ECE 834 (Mandatory) no later than the third semester of PhD enrollment.
- Before completing 4 semesters of PhD enrollment, submit the Plan of Work in the [MyPackPortal](#). If changes need to be made to the Plan of Work, contact the ECE Graduate Office to request that they reset the Plan of Work.
- After receiving an Unconditional Pass on the Qualifying Review Exam, plan to take the Preliminary Oral Examination. At least 3 weeks before the Preliminary Oral Examination date, submit the Request to Schedule the Preliminary Oral Examination form to the ECE Graduate Office. The Preliminary Exam cannot be held earlier than the end of the second year of graduate study or later than 4 calendar months before the Final Oral Examination.
- After receiving an Unconditional Pass on the Preliminary Oral Examination, attend an Electronic Thesis and Dissertation (ETD) Workshop. Refer to these links for [Workshops & Seminars Information](#) and [ETD Workshop Registration](#).
- At least 10 days before the Final Oral Examination date, submit the Request to Schedule the Final Oral Examination form to the ECE Graduate Office.
- After the Final Oral Examination has been scheduled, Apply to Graduate in the [MyPackPortal](#) before the Graduate School's [deadline](#). The Plan of Work must be submitted before applying to graduate.
- Submit the ETD Review copy of the dissertation to the Graduate School through their ETD submission website by deadline.
- At least one month before graduation, submit the Final Error-Free ETD copy of the dissertation to the Graduate School through their ETD submission website before their [deadline](#).

Appendix B, C, and D: ECE Specialty Areas and course detail

ECE Specialty Areas Abbreviations used in Appendices B, C, and D		
Major		
CPE	Computer Engineering	
	COMP ARCH	Computer Architecture
	NETWORKING	Networking
	SOFTWARE	Software
	VLSI SYSTEMS	VLSI Systems
EE	Electrical Engineering	
	BIOELECTRONICS	Bioelectronics
	CIRCUITS	Circuits
	COMMUNICATIONS	Communications
	MW CKTS/APP EM	Microwave Circuits and Applied Electromagnetics
	EPM	Physical Electronics, Photonics & Magnetics
	PWR ELEC	Power Electronics
	PWR SYS	Power Systems
	ROBOTICS/MECH/CONTROL INSTR	Robotic, Mechatronics, Control and Instrumentation
	SIGNAL PROC/COMP INTEL	Signal Processing and Computational Intelligence

Appendix B: ECE Course Detail, listed by Specialty (Updated 08/2022)

CONSULT COURSE CATALOG FOR AVAILABILITY each TERM

COURSE NO.	MAJOR	COURSE TITLE	SPECIALTY AREA	SEMESTER	
ECE	505	EE	NEURAL INTERFACE ENGINEERING	BIOELECTRONICS	F
ECE(BME)	518	EE	WEARABLE BIOSENSORS & MICROSYSTEMS	BIOELECTRONICS	F
ECE(BME)	522	EE	MEDICAL INSTRUMENTATION	BIOELECTRONICS	S
ECE	511	EE	ANALOG ELECTRONICS	CIRCUITS	F
ECE	712	EE	INTEGRATED CIRCUIT DESIGN FOR WIRELESS COMMUNICATIONS	CIRCUITS	S
ECE	714	EE	ADVANCED INTEGRATED CIRCUIT DESIGN: DATA CONVERTERS	CIRCUITS	FE
ECE	718	EE	COMPUTER-AIDED CIRCUIT ANALYSIS	CIRCUITS	V
ECE	733	EE	DIGITAL ELECTRONICS	CIRCUITS	F
ECE	515	EE	DIGITAL COMMUNICATIONS	COMMUNICATIONS	S
ECE	582	EE	WIRELESS COMMUNICATION SYSTEMS	COMMUNICATIONS	F
ECE	751	EE	DETECTION AND ESTIMATION THEORY	COMMUNICATIONS	SO
ECE	752	EE	INFORMATION THEORY	COMMUNICATIONS	SO
ECE	762	EE	ADVANCED DIGITAL COMMUNICATIONS SYSTEMS	COMMUNICATIONS	FO
ECE	766	EE	SIGNAL PROCESSING FOR COMMUNICATIONS AND NETWORKING	COMMUNICATIONS	FE
ECE	767	EE	ERROR-CONTROL CODING	COMMUNICATIONS	SE
ECE(CSC)	506	CPE	ARCHITECTURE OF PARALLEL COMPUTERS	COMP ARCH	F/S
ECE	560	CPE	EMBEDDED SYSTEM ARCHITECTURE	COMP ARCH	F
ECE	561	CPE	EMBEDDED SYSTEM OPTIMIZATION	COMP ARCH	S
ECE	563	CPE	MICROPROCESSOR ARCHITECTURE	COMP ARCH	F/S
ECE	705	CPE	MEMORY SYSTEMS	COMP ARCH	V
ECE	706	CPE	ADVANCED PARALLEL COMPUTER ARCHITECTURE	COMP ARCH	V
ECE	721	CPE	ADVANCED MICROARCHITECTURE	COMP ARCH	V
ECE	785	CPE	TOPICS IN ADVANCED COMPUTER DESIGN	COMP ARCH	S
ECE	786	CPE	ADVANCED COMPUTER ARCHITECTURE: DATA PARALLEL PROCESSORS	COMP ARCH	S
ECE	523	EE	PHOTONICS AND OPTICAL COMMUNICATIONS	EPM	S
ECE	530	EE	PHYSICAL ELECTRONICS <i>(REQUIRED FOR NEP MAJORS)</i>	EPM	F
ECE	531	EE	PRINCIPLES OF TRANSISTOR DEVICES	EPM	V
ECE	538	EE	INTEGRATED CIRCUITS TECHNOLOGY AND FABRICATION	EPM	F
ECE	557	EE	PRINCIPLES OF MOS TRANSISTORS	EPM	V
ECE(CHE)	568	EE	CONVENTIONAL AND EMERGING NANOMANUFACTURING TECHNIQUES AND THEIR APPLICATIONS IN NANOSYSTEMS	EPM	F
ECE(MSE)(PY)	589	EE	SOLID STATE SOLAR AND THERMAL HARVESTING	EPM	S
ECE	722	EE	ELECTRONIC PROPERTIES OF SOLID STATE MATERIALS	EPM	V
ECE	723	EE	OPTICAL PROPERTIES OF SEMICONDUCTORS	EPM	V
ECE	724	EE	ELECTRONIC PROPERTIES OF SOLID STATE DEVICES	EPM	V
ECE	725	EE	QUANTUM ENGINEERING	EPM	V
ECE	739	EE	INTEGRATED CIRCUIT TECHNOLOGY & FABRICATION LABORATORY	EPM	V
ECE	524	EE	RADIO SYSTEM DESIGN	MW CKTS/APP EM	S
ECE	532	EE	PRINCIPLES OF MICROWAVE CIRCUITS	MW CKTS/APP EM	V
ECE	540	EE	ELECTROMAGNETIC FIELDS	MW CKTS/APP EM	SE
ECE	541	EE	ANTENNAS AND ARRAYS	MW CKTS/APP EM	SO
ECE	549	EE	RF DESIGN FOR WIRELESS	MW CKTS/APP EM	F
ECE	719	EE	MICROWAVE CIRCUIT DESIGN USING SCATTERING PARAMETERS	MW CKTS/APP EM	V
ECE(CSC)	547	CPE	CLOUD COMPUTING TECHNOLOGY	NETWORKING	V
ECE(CSC)	570	CPE	COMPUTER NETWORKS	NETWORKING	F/S
ECE(CSC)	573	CPE	INTERNET PROTOCOLS	NETWORKING	F/S
ECE(CSC)	574	CPE	COMPUTER AND NETWORK SECURITY	NETWORKING	F/S
ECE(CSC)	575	CPE	INTRODUCTION TO WIRELESS NETWORKING	NETWORKING	S
ECE(CSC)	577	CPE	SWITCHED NETWORK MANAGEMENT	NETWORKING	F
ECE	578	CPE	LTE AND 5G COMMUNICATIONS	NETWORKING	F
ECE(CSC)	773	CPE	ADVANCED TOPICS IN INTERNET PROTOCOLS	NETWORKING	S
ECE(CSC)	774	CPE	ADVANCED NETWORK SECURITY	NETWORKING	S
ECE(CSC)	775	CPE	ADVANCED TOPICS IN WIRELESS NETWORKING	NETWORKING	F
ECE(CSC)	776	CPE	DESIGN & PERFORMANCE EVALUATION OF NETWORK SYSTEMS & SERVICES	NETWORKING	V
ECE(CSC)	777	CPE	TELECOMMUNICATIONS NETWORK DESIGN	NETWORKING	V
ECE	533	EE	POWER ELECTRONICS DESIGN & PACKAGING	PWR ELEC	S
ECE	534	EE	POWER ELECTRONICS	PWR ELEC	F
ECE(MAE)	535	EE	DESIGN OF ELECTROMECHANICAL SYSTEMS	PWR ELEC	S
ECE	553	EE	SEMICONDUCTOR POWER DEVICES	PWR ELEC	F
ECE	554	EE	ELECTRIC MOTOR DRIVES	PWR ELEC	V
ECE	732	EE	DYNAMICS AND CONTROL OF ELECTRIC MACHINES	PWR ELEC	F
ECE	734	EE	POWER MANAGEMENT INTEGRATED CIRCUITS	PWR ELEC	FO
ECE	735	EE	WIDE BAND GAP SEMICONDUCTOR POWER DEVICES	PWR ELEC	S
ECE	550	EE	POWER SYSTEM OPERATION AND CONTROL	PWR SYS	F
ECE	551	EE	SMART ELECTRIC POWER DISTRIBUTION SYSTEMS	PWR SYS	S

Key to course offerings: F/S-Fall/Spring, F-Fall, FE-Fall Even Years, FO-Fall Odd Years, S-Spring, SA-Spring Alternate Years, SE-Spring Even Years, SO-Spring Odd Years, V-Variable, depending on instructor availability

Appendix B: ECE Course Detail, listed by Specialty (Updated 08/2022)

CONSULT COURSE CATALOG FOR AVAILABILITY each TERM

COURSE NO.		MAJOR	COURSE TITLE	SPECIALTY AREA	SEMESTER
ECE	584	EE	ELECTRIC POWER ENGINEERING PRACTICUM II (<i>RESTRICTED TO MS-EPSE STUDENTS</i>)	PWR SYS	S
ECE	585	EE	THE BUSINESS OF THE ELECTRIC UTILITY INDUSTRY	PWR SYS	F
ECE	586	EE	COMMUNICATION AND SCADA SYSTEMS FOR SMART GRID	PWR SYS	F
ECE	736	EE	POWER SYSTEM STABILITY AND CONTROL	PWR SYS	S
ECE	753	EE	COMPUTATIONAL METHODS FOR POWER GRID OPERATION & PLANNING	PWR SYS	F
ECE	516	EE	SYSTEM CONTROL ENGINEERING	ROBOTICS/MECH/ CONTROL INSTR	S
ECE(BME)	522	EE	MEDICAL INSTRUMENTATION	ROBOTICS/MECH/ CONTROL INSTR	S
ECE(BME)	536	EE	DIGITAL CONTROL SYSTEMS	ROBOTICS/MECH/ CONTROL INSTR	F
ECE	555	EE	COMPUTER CONTROL OF ROBOTS	ROBOTICS/MECH/ CONTROL INSTR	S
ECE	556	EE	AGENT-BASED MECHATRONICS SYSTEMS	ROBOTICS/MECH/ CONTROL INSTR	F
ECE	726	EE	ADVANCED FEEDBACK CONTROL	ROBOTICS/MECH/ CONTROL INSTR	F
ECE	756	EE	ADVANCED MECHATRONICS	ROBOTICS/MECH/ CONTROL INSTR	V
ECE	513	EE	DIGITAL SIGNAL PROCESSING	SIGNAL PROC/ COMP INTEL	F
ECE	542	EE	NEURAL NETWORKS	SIGNAL PROC/ COMP INTEL	F
ECE	558	EE	DIGITAL IMAGING SYSTEMS	SIGNAL PROC/ COMP INTEL	F
ECE	588	EE	SYSTEMS BIOLOGY MODELING OF PLANT REGULATION	SIGNAL PROC/ COMP INTEL	F
ECE	759	EE	PATTERN RECOGNITION	SIGNAL PROC/ COMP INTEL	SE
ECE	763	EE	COMPUTER VISION	SIGNAL PROC/ COMP INTEL	S
ECE	765	EE	PROBABILISTIC GRAPHICAL MODELS FOR SIGNAL PROCESSING AND COMPUTER VISION	SIGNAL PROC/ COMP INTEL	F
ECE(CSC)	517	CPE	OBJECT-ORIENTED DESIGN & DEVELOPMENT	SOFTWARE	F/S
ECE	565	CPE	OPERATING SYSTEMS DESIGN	SOFTWARE	F
ECE	566	CPE	CODE GENERATION AND OPTIMIZATION	SOFTWARE	S
ECE	544	EE	DESIGN OF ELECTRONIC PACKAGING & INTERCONNECTS	VLSI SYSTEMS	S
ECE	546	EE/CPE	VLSI SYSTEMS DESIGN	VLSI SYSTEMS	S
ECE	564	CPE	DIGITAL ASIC DESIGN	VLSI SYSTEMS	F
ECE	720	CPE	ELECTRONIC SYSTEM LEVEL & PHYSICAL DESIGN	VLSI SYSTEMS	F
ECE	745	CPE	ASIC VERIFICATION	VLSI SYSTEMS	S
ECE	748	CPE	ADVANCED FUNCTIONAL VERIFICATION WITH UNIVERSAL VERIFICATION METHODOLOGY	VLSI SYSTEMS	F
ECE	505	EE	NEURAL INTERFACE ENGINEERING	SEE FOOTNOTE	F
ECE	514	EE	RANDOM PROCESSES	SEE FOOTNOTE	F
ECE(BME)	518	EE	WEARABLE BIOSENSORS & MICROSYSTEMS	SEE FOOTNOTE	F
ECE	592	EE/CPE	SPECIAL TOPICS IN ECE (depends on topic)	SEE FOOTNOTE	V
ECE	600	EE/CPE	ECE GRADUATE ORIENTATION: MANDATORY FOR INCOMING STUDENTS	SEE FOOTNOTE	F
ECE	633	EE/CPE	INDIVIDUAL TOPICS IN ECE (MS)	SEE FOOTNOTE	V
ECE	634	EE/CPE	INDIVIDUAL STUDIES IN ECE (MS)	SEE FOOTNOTE	V
ECE	695	EE/CPE	MASTER'S THESIS RESEARCH	SEE FOOTNOTE	V
ECE	696	EE/CPE	SUMMER THESIS RESEARCH (MS)	SEE FOOTNOTE	V
ECE	699	EE/CPE	MASTER'S THESIS PREPARATION	SEE FOOTNOTE	V
ECE	791	EE/CPE	SPECIAL TOPICS IN ECE (depends on topic)	SEE FOOTNOTE	V
ECE	792	EE/CPE	SPECIAL TOPICS IN ECE (depends on topic)	SEE FOOTNOTE	V
ECE	833	EE/CPE	INDIVIDUAL TOPICS IN ECE (PHD Level)	SEE FOOTNOTE	V
ECE	834	EE/CPE	INDIVIDUAL STUDIES IN ECE FOR QUALIFYING REVIEW (PHD Level)	SEE FOOTNOTE	V
ECE	895	EE/CPE	DOCTORAL DISSERTATION RESEARCH	SEE FOOTNOTE	V
ECE	896	EE/CPE	SUMMER DISSERTATION RESEARCH (PHD)	SEE FOOTNOTE	V
ECE	899	EE/CPE	DOCTORAL DISSERTATION PREPARATION	SEE FOOTNOTE	V
FOOTNOTE		COURSE IS NOT ASSOCIATED WITH ANY SPECIFIC SPECIALTY AREA AND CANNOT BE USED TO SATISFY THE BREADTH REQUIREMENT FOR A DEGREE.			

Key to course offerings: F/S-Fall/Spring, F-Fall, FE-Fall Even Years, FO-Fall Odd Years, S-Spring, SA-Spring Alternate Years, SE-Spring Even Years, SO-Spring Odd Years, V-Variable, depending on instructor availability

Appendix C: ECE Course Detail, listed numerically (Updated 08/2022)

CONSULT COURSE CATALOG FOR AVAILABILITY each TERM

COURSE NO.	MAJOR	COURSE TITLE	SPECIALTY AREA	SEMESTER
ECE	505	EE NEURAL INTERFACE ENGINEERING	BIOELECTRONICS	F
ECE(CSC)	506	CPE ARCHITECTURE OF PARALLEL COMPUTERS	COMP ARCH	F/S
ECE	511	EE ANALOG ELECTRONICS	CIRCUITS	F
ECE	513	EE DIGITAL SIGNAL PROCESSING	SIGNAL PROC/ COMP INTEL	F
ECE	514	EE RANDOM PROCESSES	SEE FOOTNOTE	F
ECE	515	EE DIGITAL COMMUNICATIONS	COMMUNICATIONS	S
ECE	516	EE SYSTEM CONTROL ENGINEERING	ROBOTICS/MECH/ CONTROL INSTR	S
ECE(CSC)	517	CPE OBJECT-ORIENTED DESIGN & DEVELOPMENT	SOFTWARE	F/S
ECE(BME)	518	EE WEARABLE BIOSENSORS & MICROSYSTEMS	BIOELECTRONICS	F
ECE(BME)	522	EE MEDICAL INSTRUMENTATION	BIOELECTRONICS	S
ECE	523	EE PHOTONICS AND OPTICAL COMMUNICATIONS	EPM	S
ECE	524	EE RADIO SYSTEM DESIGN	MW CKTS/APP EM	S
ECE	530	EE PHYSICAL ELECTRONICS (REQUIRED FOR NEP MAJORS)	EPM	F
ECE	531	EE PRINCIPLES OF TRANSISTOR DEVICES	EPM	V
ECE	532	EE PRINCIPLES OF MICROWAVE CIRCUITS	MW CKTS/APP EM	V
ECE	533	EE POWER ELECTRONICS DESIGN & PACKAGING	PWR ELEC	S
ECE	534	EE POWER ELECTRONICS	PWR ELEC	F
ECE(MAE)	535	EE DESIGN OF ELECTROMECHANICAL SYSTEMS	PWR ELEC	S
ECE(BME)	536	EE DIGITAL CONTROL SYSTEMS	ROBOTICS/MECH/ CONTROL INSTR	F
ECE	538	EE INTEGRATED CIRCUITS TECHNOLOGY AND FABRICATION	EPM	F
ECE	540	EE ELECTROMAGNETIC FIELDS	MW CKTS/APP EM	SE
ECE	541	EE ANTENNAS AND ARRAYS	MW CKTS/APP EM	SO
ECE	542	EE NEURAL NETWORKS	SIGNAL PROC/ COMP INTEL	V
ECE	544	EE DESIGN OF ELECTRONIC PACKAGING & INTERCONNECTS	VLSI SYSTEMS	S
ECE	546	EE/CPE VLSI SYSTEMS DESIGN	VLSI SYSTEMS	S
ECE(CSC)	547	CPE CLOUD COMPUTING TECHNOLOGY	NETWORKING	V
ECE	549	EE RF DESIGN FOR WIRELESS	MW CKTS/APP EM	F
ECE	550	EE POWER SYSTEM OPERATION AND CONTROL	PWR SYS	F
ECE	551	EE SMART ELECTRIC POWER DISTRIBUTION SYSTEMS	PWR SYS	S
ECE	552	EE RENEWABLE ELECTRIC ENERGY SYSTEMS	PWR SYS	S
ECE	553	EE SEMICONDUCTOR POWER DEVICES	PWR ELEC	F
ECE	554	EE ELECTRIC MOTOR DRIVES	PWR ELEC	V
ECE	555	EE COMPUTER CONTROL OF ROBOTS	ROBOTICS/MECH/ CONTROL INSTR	S
ECE	556	EE AGENT-BASED MECHATRONICS SYSTEMS	ROBOTICS/MECH/ CONTROL INSTR	F
ECE	557	EE PRINCIPLES OF MOS TRANSISTORS	EPM	V
ECE	558	EE DIGITAL IMAGING SYSTEMS	SIGNAL PROC/ COMP INTEL	F
ECE	560	CPE EMBEDDED SYSTEM ARCHITECTURE	COMP ARCH	F
ECE	561	CPE EMBEDDED SYSTEM OPTIMIZATION	COMP ARCH	S
ECE	563	CPE MICROPROCESSOR ARCHITECTURE	COMP ARCH	F/S
ECE	564	CPE DIGITAL ASIC DESIGN	VLSI SYSTEMS	F
ECE	565	CPE OPERATING SYSTEMS DESIGN	SOFTWARE	F
ECE	566	CPE CODE GENERATION AND OPTIMIZATION	SOFTWARE	S
ECE(CHE)	568	EE CONVENTIONAL AND EMERGING NANOMANUFACTURING TECHNIQUES AND THEIR APPLICATIONS IN NANOSYSTEMS	EPM	F
ECE(CSC)	570	CPE COMPUTER NETWORKS	NETWORKING	F/S
ECE(CSC)	573	CPE INTERNET PROTOCOLS	NETWORKING	F/S
ECE(CSC)	574	CPE COMPUTER AND NETWORK SECURITY	NETWORKING	F/S
ECE(CSC)	575	CPE INTRODUCTION TO WIRELESS NETWORKING	NETWORKING	S
ECE(CSC)	577	CPE SWITCHED NETWORK MANAGEMENT	NETWORKING	F
ECE	578	CPE LTE AND 5G COMMUNICATIONS	NETWORKING	F
ECE	581	EE ELECTRIC POWER SYSTEM PROTECTION	PWR SYS	S
ECE	582	EE WIRELESS COMMUNICATION SYSTEMS	COMMUNICATIONS	F
ECE	583	EE ELECTRIC POWER ENGINEERING PRACTICUM I (RESTRICTED TO MS-EPSE STUDENTS)	PWR SYS	S
ECE	584	EE ELECTRIC POWER ENGINEERING PRACTICUM II (RESTRICTED TO MS-EPSE STUDENTS)	PWR SYS	F
ECE	585	EE THE BUSINESS OF THE ELECTRIC UTILITY INDUSTRY	PWR SYS	F
ECE	586	EE COMMUNICATION AND SCADA SYSTEMS FOR SMART GRID	PWR SYS	F
ECE	587	EE POWER SYSTEM TRANSIENTS ANALYSIS	PWR SYS	F
ECE	588	EE SYSTEMS BIOLOGY MODELING OF PLANT REGULATION	SIGNAL PROC/ COMP INTEL	F
ECE(MSE)(PY)	589	EE SOLID STATE SOLAR AND THERMAL HARVESTING	EPM	S
ECE	591	EE/CPE SPECIAL TOPICS IN ECE (depends on topic)	SEE FOOTNOTE	V
ECE	592	EE/CPE SPECIAL TOPICS IN ECE (depends on topic)	SEE FOOTNOTE	V
ECE	600	EE/CPE ECE GRADUATE ORIENTATION: MANDATORY FOR INCOMING STUDENTS	SEE FOOTNOTE	F
ECE	633	EE/CPE INDIVIDUAL TOPICS IN ECE (MS)	SEE FOOTNOTE	V
ECE	634	EE/CPE INDIVIDUAL STUDIES IN ECE (MS)	SEE FOOTNOTE	V
ECE	695	EE/CPE MASTER'S THESIS RESEARCH	SEE FOOTNOTE	V
ECE	696	EE/CPE SUMMER THESIS RESEARCH (MS)	SEE FOOTNOTE	V

Key to course offerings: F/S-Fall/Spring, F-Fall, FE-Fall Even Years, FO-Fall Odd Years, S-Spring, SA-Spring Alternate Years, SE-Spring Even Years, SO-Spring Odd Years, V-Variable, depending on instructor availability

Appendix C: ECE Course Detail, listed numerically (Updated 08/2022)

CONSULT COURSE CATALOG FOR AVAILABILITY each TERM

COURSE NO.		MAJOR	COURSE TITLE	SPECIALTY AREA	SEMESTER
ECE	699	EE/CPE	MASTER'S THESIS PREPARATION	SEE FOOTNOTE	V
ECE	705	CPE	MEMORY SYSTEMS	COMP ARCH	V
ECE	706	CPE	ADVANCED PARALLEL COMPUTER ARCHITECTURE	COMP ARCH	V
ECE	712	EE	INTEGRATED CIRCUIT DESIGN FOR WIRELESS COMMUNICATIONS	CIRCUITS	S
ECE	714	EE	ADVANCED INTEGRATED CIRCUIT DESIGN: DATA CONVERTERS	CIRCUITS	FE
ECE	718	EE	COMPUTER-AIDED CIRCUIT ANALYSIS	CIRCUITS	V
ECE	719	EE	MICROWAVE CIRCUIT DESIGN USING SCATTERING PARAMETERS	MW CKTS/APP EM	V
ECE	720	CPE	ELECTRONIC SYSTEM LEVEL & PHYSICAL DESIGN	VLSI SYSTEMS	F
ECE	721	CPE	ADVANCED MICROARCHITECTURE	COMP ARCH	V
ECE	722	EE	ELECTRONIC PROPERTIES OF SOLID STATE MATERIALS	EPM	V
ECE	723	EE	OPTICAL PROPERTIES OF SEMICONDUCTORS	EPM	V
ECE	724	EE	ELECTRONIC PROPERTIES OF SOLID STATE DEVICES	EPM	V
ECE	725	EE	QUANTUM ENGINEERING	EPM	V
ECE	726	EE	ADVANCED FEEDBACK CONTROL	ROBOTICS/MECH/ CONTROL INSTR	V
ECE	732	EE	DYNAMICS AND CONTROL OF ELECTRIC MACHINES	PWR ELEC	F
ECE	733	EE	DIGITAL ELECTRONICS	CIRCUITS	F
ECE	734	EE	POWER MANAGEMENT INTEGRATED CIRCUITS	PWR ELEC	FO
ECE	735	EE	WIDE BAND GAP SEMICONDUCTOR POWER DEVICES	PWR ELEC	S
ECE	736	EE	POWER SYSTEM STABILITY AND CONTROL	PWR SYS	V
ECE	739	EE	INTEGRATED CIRCUIT TECHNOLOGY & FABRICATION LABORATORY	EPM	V
ECE	745	CPE	ASIC VERIFICATION	VLSI SYSTEMS	S
ECE	748	CPE	ADVANCED FUNCTIONAL VERIFICATION WITH UNIVERSAL VERIFICATION METHODOLOGY	VLSI SYSTEMS	F
ECE	751	EE	DETECTION AND ESTIMATION THEORY	COMMUNICATIONS	SO
ECE	752	EE	INFORMATION THEORY	COMMUNICATIONS	SO
ECE	753	EE	COMPUTATIONAL METHODS FOR POWER GRID OPERATION & PLANNING	PWR SYS	S
ECE	756	EE	ADVANCED MECHATRONICS	ROBOTICS/MECH/ CONTROL INSTR	V
ECE	759	EE	PATTERN RECOGNITION	SIGNAL PROC/ COMP INTEL	SE
ECE	762	EE	ADVANCED DIGITAL COMMUNICATIONS SYSTEMS	COMMUNICATIONS	FO
ECE	763	EE	COMPUTER VISION	SIGNAL PROC/ COMP INTEL	S
ECE	765	EE	PROBABILISTIC GRAPHICAL MODELS FOR SIGNAL PROCESSING AND COMPUTER VISION	SIGNAL PROC/ COMP INTEL	V
ECE	766	EE	SIGNAL PROCESSING FOR COMMUNICATIONS AND NETWORKING	COMMUNICATIONS	FE
ECE	767	EE	ERROR-CONTROL CODING	COMMUNICATIONS	SE
ECE(CSC)	773	CPE	ADVANCED TOPICS IN INTERNET PROTOCOLS	NETWORKING	S
ECE(CSC)	774	CPE	ADVANCED NETWORK SECURITY	NETWORKING	S
ECE(CSC)	775	CPE	ADVANCED TOPICS IN WIRELESS NETWORKING	NETWORKING	F
ECE(CSC)	776	CPE	DESIGN & PERFORMANCE EVALUATION OF NETWORK SYSTEMS & SERVICES	NETWORKING	V
ECE(CSC)	777	CPE	TELECOMMUNICATIONS NETWORK DESIGN	NETWORKING	V
ECE	785	CPE	TOPICS IN ADVANCED COMPUTER DESIGN	COMP ARCH	S
ECE	786	CPE	ADVANCED COMPUTER ARCHITECTURE: DATA PARALLEL PROCESSORS	COMP ARCH	S
ECE	791	EE/CPE	SPECIAL TOPICS IN ECE (depends on topic)	SEE FOOTNOTE	V
ECE	792	EE/CPE	SPECIAL TOPICS IN ECE (depends on topic)	SEE FOOTNOTE	V
ECE	833	EE/CPE	INDIVIDUAL TOPICS IN ECE (PHD Level)	SEE FOOTNOTE	V
ECE	834	EE/CPE	INDIVIDUAL STUDIES IN ECE FOR QUALIFYING REVIEW (PHD Level)	SEE FOOTNOTE	V
ECE	895	EE/CPE	DOCTORAL DISSERTATION RESEARCH	SEE FOOTNOTE	V
ECE	896	EE/CPE	SUMMER DISSERTATION RESEARCH (PHD)	SEE FOOTNOTE	V
ECE	899	EE/CPE	DOCTORAL DISSERTATION PREPARATION	SEE FOOTNOTE	V
FOOTNOTE			COURSE IS NOT ASSOCIATED WITH ANY SPECIFIC SPECIALTY AREA AND CANNOT BE USED TO SATISFY THE BREADTH REQUIREMENT FOR A DEGREE.		

Key to course offerings: F/S-Fall/Spring, F-Fall, FE-Fall Even Years, FO-Fall Odd Years, S-Spring, SA-Spring Alternate Years, SE-Spring Even Years, SO-Spring Odd Years, V-Variable, depending on instructor availability

Appendix D: ECE Course Detail Quick Look (Last Updated 8/2022)

CONSULT COURSE CATALOG FOR AVAILABILITY each TERM

COURSE #	MAJOR	SPECIALTY AREA	SEMESTER	COURSE #	MAJOR	SPECIALTY AREA	SEMESTER		
ECE	505	EE	BIOELECTRONICS	F	ECE(MSE)	589	EE	EPM	S
ECE(CSC)	506	CPE	COMP ARCH	F/S	ECE	705	CPE	COMP ARCH	V
ECE	511	EE	CIRCUITS	F	ECE	706	CPE	COMP ARCH	V
ECE	513	EE	SIGNAL PROC/ COMP INTEL	F	ECE	712	EE	CIRCUITS	S
ECE	514	EE	SEE FOOTNOTE	F	ECE	714	EE	CIRCUITS	FE
ECE	515	EE	COMMUNICATIONS	S	ECE	718	EE	CIRCUITS	V
ECE	516	EE	ROBOTICS/MECH/ CONTROL INSTR	S	ECE	719	EE	MW CKTS/APP EM	V
ECE(CSC)	517	CPE	SOFTWARE	F/S	ECE	720	CPE	VLSI SYSTEMS	F
ECE(BME)	518	EE	BIOELECTRONICS	F	ECE	721	CPE	COMP ARCH	V
ECE(BME)	522	EE	ROBOTICS/MECH/ CONTROL INSTR	S	ECE	722	EE	EPM	V
ECE	523	EE	EPM	S	ECE	723	EE	EPM	V
ECE	524	EE	MW CKTS/APP EM	S	ECE	724	EE	EPM	V
ECE	530	EE	EPM	F	ECE	725	EE	EPM	V
ECE	531	EE	EPM	V	ECE	726	EE	ROBOTICS/MECH/ CONTROL INSTR	V
ECE	532	EE	MW CKTS/APP EM	V	ECE	732	EE	PWR ELEC	F
ECE	533	EE	PWR ELEC	S	ECE	733	EE	CIRCUITS	F
ECE	534	EE	PWR ELEC	F	ECE	734	EE	PWR ELEC	FO
ECE(MAE)	535	EE	PWR ELEC	S	ECE	735	EE	PWR ELEC	S
ECE(BME)	536	EE	ROBOTICS/MECH/ CONTROL INSTR	F	ECE	736	EE	PWR SYS	V
ECE	538	EE	EPM	F	ECE	739	EE	EPM	V
ECE	540	EE	MW CKTS/APP EM	SE	ECE	745	CPE	VLSI SYSTEMS	S
ECE	541	EE	MW CKTS/APP EM	SO	ECE	748	CPE	VLSI SYSTEMS	F
ECE	542	EE	SIGNAL PROC/ COMP INTEL	V	ECE	751	EE	COMMUNICATIONS	SO
ECE	544	EE	VLSI SYSTEMS	S	ECE	752	EE	COMMUNICATIONS	SO
ECE	546	EE/CPE	VLSI SYSTEMS	S	ECE	753	EE	PWR SYS	S
ECE(CSC)	547	CPE	NETWORKING	V	ECE	756	EE	ROBOTICS/MECH/ CONTROL INSTR	V
ECE	549	EE	MW CKTS/APP EM	F	ECE	759	EE	SIGNAL PROC/ COMP INTEL	SE
ECE	550	EE	PWR SYS	F	ECE	762	EE	COMMUNICATIONS	FO
ECE	551	EE	PWR SYS	S	ECE	763	EE	SIGNAL PROC/ COMP INTEL	S
ECE	552	EE	PWR SYS	S	ECE	765	EE	SIGNAL PROC/ COMP INTEL	V
ECE	553	EE	PWR ELEC	F	ECE	766	EE	COMMUNICATIONS	FE
ECE	554	EE	PWR ELEC	V	ECE	767	EE	COMMUNICATIONS	SE
ECE	555	EE	ROBOTICS/MECH/ CONTROL INSTR	S	ECE(CSC)	773	CPE	NETWORKING	S
ECE	556	EE	ROBOTICS/MECH/ CONTROL INSTR	F	ECE(CSC)	774	CPE	NETWORKING	S
ECE	557	EE	EPM	V	ECE(CSC)	775	CPE	NETWORKING	F
ECE	558	EE	SIGNAL PROC/ COMP INTEL	F	ECE(CSC)	776	CPE	NETWORKING	V
ECE	560	CPE	COMP ARCH	F	ECE(CSC)	777	CPE	NETWORKING	V
ECE	561	CPE	COMP ARCH	S	ECE	785	CPE	COMP ARCH	S
ECE	563	CPE	COMP ARCH	F/S	ECE	786	CPE	COMP ARCH	S
ECE	564	CPE	VLSI SYSTEMS	F	ECE	591	EE/CPE	SEE FOOTNOTE	V
ECE	565	CPE	SOFTWARE	F	ECE	592	EE/CPE	SEE FOOTNOTE	V
ECE	566	CPE	SOFTWARE	S	ECE	600	EE/CPE	SEE FOOTNOTE	F
ECE(CHE)	568	EE	EPM	F	ECE	633	EE/CPE	SEE FOOTNOTE	V
ECE(CSC)	570	CPE	NETWORKING	F/S	ECE	634	EE/CPE	SEE FOOTNOTE	V
ECE(CSC)	573	CPE	NETWORKING	F/S	ECE	695	EE/CPE	SEE FOOTNOTE	V
ECE(CSC)	574	CPE	NETWORKING	F/S	ECE	696	EE/CPE	SEE FOOTNOTE	V
ECE(CSC)	575	CPE	NETWORKING	S	ECE	699	EE/CPE	SEE FOOTNOTE	V
ECE(CSC)	576	CPE	NETWORKING	V	ECE	791	EE/CPE	SEE FOOTNOTE	V
ECE(CSC)	577	CPE	NETWORKING	F	ECE	792	EE/CPE	SEE FOOTNOTE	V
ECE	578	CPE	NETWORKING	F	ECE	833	EE/CPE	SEE FOOTNOTE	V
ECE(CSC)(OR)	579	CPE	NETWORKING	F/S	ECE	834	EE/CPE	SEE FOOTNOTE	V
ECE	581	EE	PWR SYS	S	ECE	895	EE/CPE	SEE FOOTNOTE	V
ECE	582	EE	COMMUNICATIONS	F	ECE	896	EE/CPE	SEE FOOTNOTE	V
ECE	583	EE	PWR SYS	S	ECE	899	EE/CPE	SEE FOOTNOTE	V
ECE	584	EE	PWR SYS	F					
ECE	585	EE	PWR SYS	F					
ECE	586	EE	PWR SYS	F					
ECE	587	EE	PWR SYS	F					
ECE	588	EE	SIGNAL PROC/ COMP INTEL	F					

FOOTNOTE	COURSE IS NOT ASSOCIATED WITH ANY SPECIFIC SPECIALTY AREA AND CANNOT BE USED TO SATISFY THE BREADTH REQUIREMENT FOR A DEGREE.
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Key to course offerings: F/S-Fall/Spring, F-Fall, FE-Fall Even Years, FO-Fall Odd Years, S-Spring, SA-Spring Alternate Years, SE-Spring Even Years, SO-Spring Odd Years, V-Variable, depending on instructor availability

Appendix E Plan of Work (POW) Worksheets for MS and PhD in EE and CPE

This appendix includes three different worksheets for the MS and PhD degrees in EE and CPE:

For MS Thesis and Non-Thesis Students:

- A minimum of at least 21 credit hours of ECE courses: 18 credit hours must be graded and 3 credit hours of 600 level courses may be taken for credit only (S/U). These must be [NC State or inter-institutional courses](#).
- For MS non-thesis (Option B) students, a maximum of three credit hours of ECE 633, ECE 634, or ECE 650 may be taken for credit only (S/U) and included on the Option B Plan of Work. ECE 695 cannot be included on the Option B Plan of Work.
- For MS thesis students, a maximum of nine credit hours may be taken for credit only (S/U) and included on the Plan of Work: three credit hours of ECE 633 or 634 and six credit hours of ECE 695.

For PhD students with only a BS degree:

- A minimum of 30 graded credit hours must be completed at NCSU.
- A minimum of 18 graded credit hours of ECE courses must be completed at NCSU.

For PhD students with an NCSU MS degree in EE, CPE, CPSE, or CNE:

With continuous enrollment: Graded courses from the MS degree meet PhD graded course requirements and can be included on the PhD plan of work.

Without continuous enrollment: A maximum of 18 graded credit hours from the MS degree can be included on the PhD plan of work and there are no other PhD graded course requirements.

For PhD students with an NCSU MS degree in a non-ECE department:

With continuous enrollment: Graded courses from the MS degree meet PhD graded course requirements and can be included on the PhD plan of work.

- A minimum of 30 graded credit hours must be completed at NCSU.
- A minimum of 6 graded credit hours of ECE courses must be completed at NCSU.

Without continuous enrollment: A maximum of 18 graded credit hours from the MS degree can be included on the PhD plan of work and a minimum of 6 graded credit hours of ECE courses must be completed at NCSU.

For PhD students with a Non-NCSU MS degree:

A maximum of 18 credit hours from the previous MS degree can be included in the PhD Plan of Work.

A minimum of 12 graded credit hours must be completed at NCSU.

A minimum of 6 graded credit hours of ECE courses must be completed at NCSU.

MS-EE or MS-CPE Plan of Work (POW) Worksheet

MS courses (31 credit hours)		DEGREE REQUIREMENTS	
1	ECE 600 (1 credit hour)		
2		Breadth(3): at least 1 course in 3 different specialties	
3			
4		Course	Computer Engineering
5			COMP ARCH
6			NETWORKING
7			SOFTWARE
8			VLSI SYSTEMS
9			
10		Course	Electrical Engineering
11			BIOELECTRONICS
			CIRCUITS
			COMMUNICATIONS
			MW CKTS/APP EM
			EPM
			PWR ELEC
			PWR SYS
			ROBOTICS/MECH/CONTROL INSTR
			SIGNAL PROC/COMP INTEL
	Optional		
		Major (5): five courses in major	
	Non-ECE: maximum of 9 credit hours	EE or CPE	Courses
1		1	
2		2	
3		3	
		4	
		5	
		Depth(1): one 700-level ECE course in major	
		EE	CPE

PhD-EE or PhD-CPE Plan of Work (POW) Worksheet for PhD students with only a BS degree

		DEGREE REQUIREMENTS	
Graded NCSU courses (30 credit hours, minimum)	credit hours	Depth(2):	two 700-level ECE courses, one of which has to be in major
		EE CPE	
		EE CPE	
Total			
Graded NCSU ECE courses (18 credit hours, minimum)			
Total			
ECE 600	1		
ECE 833, 834, 895 credit hours			
Graded NCSU courses (30 credit hours, minimum)			
Total (72 hours, minimum)			

PhD-EE or PhD-CPE Plan of Work (POW) Worksheet for PhD students with an NCSU MS degree in a non-ECE department

	Graded NCSU courses (30 credit hours, minimum)	credit hours		Depth(2):	two 700-level ECE courses, one of which has to be in major
1				EE	CPE
2				EE	CPE
3					
4					
5					
6					
7					
8					
9					
10					
	Total				
	Graded NCSU ECE courses (6 credit hours, minimum)				
1					
2					
	Total				
With continuous enrollment:					
	ECE 600	1			
	ECE 833, 834, 895 credit hours				
	Graded NCSU courses (30 credit hours, minimum)				
	Total (72 hours, minimum)				
Without continuous enrollment: A maximum of 18 graded credit hours from MS degree can be included on PhD plan of work and a minimum of 6 graded credit hours of NCSU ECE courses must be completed					

PhD-EE or PhD-CPE Plan of Work (POW) Worksheet for PhD students with a non-NCSU MS degree

		DEGREE REQUIREMENTS	
Graded NCSU courses (12 credit hours, minimum)	credit hours	Depth(2):	two 700-level ECE courses, one of which has to be in major
		EE CPE	
		EE CPE	
Total			
Graded NCSU ECE courses (6 credit hours, minimum)			
Total			
ECE 600	1		
MS Credit Hours	18		
Graded NCSU courses (12 credit hours, minimum)			
ECE 833, 834, 895 credit hours			
Total (72 hours, minimum)			