Department of Electrical and Computer Engineering  
College of Engineering  
Michigan State University

Graduate Studies Handbook

Information on Masters and Doctoral Programs

Revised September 2021

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Date of Revision: April 6, 2021
In Section 2.1.1: The Ph.D. Qualifying Examination
ECE 842: Performance Modeling of Communication was added to The Ph.D.-Qualifying Core Courses table and this course will be offered every Fall semester.

Date of Revision: April 6, 2021
In Section 2.1.1: The Ph.D. Qualifying Examination

<table>
<thead>
<tr>
<th>Old</th>
<th>Old Schedule of part B qualifying examination: After passing part A of the exam, the student has until the end of the next fall semester to satisfy the part B requirement.</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>New Schedule of part B qualifying examination: The student is required to complete Part B within the first two years of their Ph.D. program. The Part B exam can be taken prior to the completion of Part A.</td>
</tr>
</tbody>
</table>

Date of Revision: April 6, 2021
In Section 2.1.1: The Ph.D. Qualifying Examination
The following sub-section was added:

Administering of part B qualifying examination: The Part B exam committee will be composed of a minimum number of 3 faculty members, with a minimum of 2 members with >50% ECE appointment.

1. By default, the PhD guidance committee will also serve as the Part B exam committee.
2. The student’s advisor can opt out of the Part B exam committee. If the advisor opts out and the rest of the guidance committee only has one member with >50% ECE appointment, the advisor will work with the Graduate Director to identify another faculty member with >50% ECE appointment who will (only) serve on the Part B exam committee.
3. The Part B exam committee will select a Chair in administering the exam.
In Section 3.3: Requirements for the Master’s Degree (Plan A)

| Old | Master’s ECE courses: Students are required to take a minimum of four ECE courses (12 credits minimum) at the 800 or 900 level, not including ECE 801. These courses must include at least two classes from the following list of core courses: |
| New | Master’s ECE courses: Students are required to take a minimum of four ECE courses (12 credits minimum) at the 800 or 900 level, not including ECE 801. These courses must include at least two classes from the following list of core courses: |
|     | ECE 820: Advanced Computer Architecture |
|     | ECE 821: Advanced Power Electronics and Applications |
|     | ECE 830: Embedded Cyber-Physical Systems |
|     | ECE 835: Advanced Electromagnetic Fields and Waves I |
|     | ECE 851: Linear Control Systems |
|     | ECE 863: Analysis of Stochastic Systems |
|     | ECE 874: Physical Electronics |
|     | ECE 821: Advanced Power Electronics and Applications |
|     | ECE 830: Embedded Cyber-Physical Systems |
|     | ECE 835: Advanced Electromagnetic Fields and Waves I |
|     | ECE 842: Performance Modeling of Communication Networks |
|     | ECE 851: Linear Control Systems |
|     | ECE 863: Analysis of Stochastic Systems |
|     | ECE 874: Physical Electronics |

Date of Revision: July 26, 2021
In Section 1.4: A Roadmap to Your Degree

| Old | • Design a program of coursework with your advisor. The Master’s Degree Program Plan is to be submitted by the end of your first semester at the website (https://www.egr.msu.edu/grs/). See also Appendix 1 in this handbook. |
| New | • Design a program of coursework with your advisor. The Master’s Degree Program Plan is to be submitted by the end of your first semester at the website (https://student.msu.edu/splash.html). See also Appendix 1 in this handbook. |
Old

Master’s degree program plan filing: The student's program of study must be approved before the student completes 6 credits of graduate work in order for the student to continue to enroll in the master's degree program. For any independent study or selected topics course that is included in the student's approved program of study, the subject material and the instructor must be specified. The academic adviser for each student will assist the student in planning a program satisfactory to the needs of the student. Changes in program plans may be made only with the approval of the adviser, the ECE Associate Chairperson for Graduate Studies, and the Associate Dean for Research and Graduate Studies. Please see Appendix 1 for guidance on planning a program in various areas of graduate study in electrical engineering. Also, please see Appendix 2 for worksheets that you may use in planning your program, and an illustration of a Master's Degree Program Plan. When you are ready to file your program, provide the information in the Graduate Reporting System (GRS) at www.eegr.msu.edu/grs/. A form will be generated and electronically circulated to the graduate secretary, then your advisor, and then to the other signatories.

New

Master’s degree program plan filing: The student's program of study must be approved before the student completes 6 credits of graduate work in order for the student to continue to enroll in the master's degree program. For any independent study or selected topics course that is included in the student's approved program of study, the subject material and the instructor must be specified. The academic adviser for each student will assist the student in planning a program satisfactory to the needs of the student. Changes in program plans may be made only with the approval of the adviser, the ECE Associate Chairperson for Graduate Studies, and the Associate Dean for Research and Graduate Studies. Please see Appendix 1 for guidance on planning a program in various areas of graduate study in electrical engineering. Also, please see Appendix 2 for worksheets that you may use in planning your program, and an illustration of a Master's Degree Program Plan. When you are ready to file your program, provide the information in the Student Information System (SIS) at https://student.msu.edu/splash.html. A form will be generated and electronically circulated to the graduate secretary, then your advisor, and then to the other signatories.

Date of Revision: July 26, 2021

In Appendix 2 — Designing Your M.S. Program in Electrical and Computer Engineering

<table>
<thead>
<tr>
<th>Old</th>
<th>New</th>
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<tbody>
<tr>
<td>2. After you and your advisor agree on a program of courses, use the web based GRS system (<a href="https://www.eegr.msu.edu/grs/">https://www.eegr.msu.edu/grs/</a>) to submit the program.</td>
<td>2. After you and your advisor agree on a program of courses, use the web based SIS system (<a href="https://student.msu.edu/splash.html">https://student.msu.edu/splash.html</a>) to submit the program.</td>
</tr>
</tbody>
</table>
### Date of Revision: July 26, 2021

#### In Section 1.4  A Road Map to Your Degree

| Old | Design a program of coursework with your guidance committee and enter your Doctoral Degree Program Plan into GradPlan ([https://gradplan.msu.edu/](https://gradplan.msu.edu/)) before the end of your second semester. See also Appendix 3 in this handbook. |
| New | Design a program of coursework with your guidance committee and enter your Doctoral Degree Program Plan into the Student Information System ([https://student.msu.edu/splash.html](https://student.msu.edu/splash.html)) before the end of your second semester. See also Appendix 3 in this handbook. |

### Date of Revision: July 26, 2021

#### In Section 3.5  Requirements for the Doctor of Philosophy Degree

| Old | **Transfer credits:** The guidance committee may, in considering the Department doctoral course credit requirements, count courses taken in graduate programs at other institutions of similar quality if they are appropriate to the student’s program and provided they were completed within the time limits approved for earning the degree. Such courses must be documented for Department records and the documentation must be included with the doctoral plan of study. It is not necessary to formally transfer such credits and they are not listed on the College of Engineering Doctoral Degree Program Plan. Instead, such courses are listed on the Department’s Supplement to the Report of the Guidance Committee and listed in the Comments section in GradPlan. This supplement should also list graduate courses taken in other graduate degree programs at MSU that the guidance committee wishes to count toward the Department’s doctoral course credit requirements. Such courses must have been taken while enrolled in a graduate degree program or while dual-enrolled in a graduate program and an undergraduate program. Courses taken in an undergraduate program should not be listed on the Supplementary Report. An undergraduate program is one in which the degree granted is a bachelor’s degree, regardless of the number of credits or years. |
| New | **Transfer credits:** The guidance committee may, in considering the Department doctoral course credit requirements, count courses taken in graduate programs at other institutions of similar quality if they are appropriate to the student’s program and provided they were completed within the time limits approved for earning the degree. Such courses must be documented for Department records and the documentation must be included with the doctoral plan of study. It is not necessary to formally transfer such credits and they are not listed on the College of Engineering Doctoral Degree Program Plan. Instead, such courses are listed on the Department’s Supplement to the Report of the Guidance Committee and listed in the Comments section in the Student Information System. This supplement should also list graduate courses taken in other graduate degree programs at MSU that the guidance committee wishes to count toward the Department’s doctoral course credit requirements. Such courses must have been taken while enrolled in a graduate degree program or while dual-enrolled in a graduate program and an undergraduate program. Courses taken in an undergraduate program should not be listed on the Supplementary Report. An undergraduate program is one in which the degree granted is a bachelor’s degree, regardless of the number of credits or years. |
### Appendix 2 – Designing Your M.S. Program in Electrical and Computer Engineering

<table>
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<th>Date of Revision: July 26, 2021</th>
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<tr>
<td>In Appendix 2 – Designing Your M.S. Program in Electrical and Computer Engineering</td>
</tr>
</tbody>
</table>

| Old | Please see Appendix 3 for worksheets that you may use in planning your doctoral program, and an illustration of a Doctoral Degree Program Plan. When you are ready to file your program, enter it into GradPlan and it will be routed for approvals, starting with the graduate secretary, then your advisor, your guidance committee, and then the other signatories. |
| New | Please see Appendix 3 for worksheets that you may use in planning your doctoral program, and an illustration of a Doctoral Degree Program Plan. When you are ready to file your program, enter it into the Student Information System and it will be routed for approvals, starting with the graduate secretary, then your advisor, your guidance committee, and then the other signatories. |

### Appendix 3 – Designing Your ECE Ph.D. Program

<table>
<thead>
<tr>
<th>Date of Revision: July 26, 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Appendix 3 – Designing Your ECE Ph.D. Program</td>
</tr>
</tbody>
</table>

| Old | 2. After you and your guidance committee agree on a program of courses for your doctoral studies, use GradPlan (https://grad.msu.edu/etd/grad-plan) to submit your program. |
| New | 2. After you and your guidance committee agree on a program of courses for your doctoral studies, use the SIS (https://student.msu.edu/splash.html) to submit your program. |

### Appendix 3.1: Worksheet: Planning Your ECE Ph.D. Program

<table>
<thead>
<tr>
<th>Date of Revision: July 26, 2021</th>
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<tbody>
<tr>
<td>In Appendix 3.1: Worksheet: Planning Your ECE Ph.D. Program</td>
</tr>
</tbody>
</table>

| Old | 2. List below the courses used in previous graduate programs at MSU, or post-bachelor’s courses taken elsewhere, that your guidance committee have approved to be used toward the 36 credit post-bachelor’s degree minimum. (Note: these courses will be listed on the form “Supplement to the Report of the Guidance Committee”). All of these courses must be graduate level. Dual level (senior/grad) courses are not to be included. Enter the list of courses on the approved Supplement form in the Comments section in GradPlan. |
| New | 2. List below the courses used in previous graduate programs at MSU, or post-bachelor’s courses taken elsewhere, that your guidance committee have approved to be used toward the 36 credit post-bachelor’s degree minimum. (Note: these courses will be listed on the form “Supplement to the Report of the Guidance Committee”). All of these courses must be graduate level. Dual level (senior/grad) courses are not to be included. Enter the list of courses on the approved Supplement form in the Comments section in the Student Information System (SIS). |
### Appendix 2 – Designing Your M.S. Program in Electrical and Computer Engineering

<table>
<thead>
<tr>
<th>Old</th>
<th>2. After you and your advisor agree on a program of courses, use the web based GRS system (<a href="https://www.egr.msu.edu/grs/">https://www.egr.msu.edu/grs/</a>) to submit the program.</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>2. After you and your advisor agree on a program of courses, use the web based SIS system (<a href="https://student.msu.edu/splash.html">https://student.msu.edu/splash.html</a>) to submit the program.</td>
</tr>
</tbody>
</table>

### Section 3.1 Student Participation

<table>
<thead>
<tr>
<th>Old</th>
<th>Electrical and Computer Engineering graduate students elect this representative from a slate of nominees, which is prepared by the graduate student body.</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>Electrical and Computer Engineering graduate students elect this representative from a slate of nominees, which is prepared by the graduate student body. The nominees shall be current Electrical and Computer Engineering graduate students and have completed at least one semester.</td>
</tr>
</tbody>
</table>

### Section 3.5 Requirements for the Doctor of Philosophy Degree

<table>
<thead>
<tr>
<th>Old</th>
<th>A minimum of three (3) of these credits must be taken outside the Engineering College in areas such as Mathematics, Statistics, and Physics.</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>To ensure breadth, a minimum of three (3) of these credits must be taken outside the Engineering College in consultation with the guidance committee.</td>
</tr>
</tbody>
</table>
1. PROGRAM OVERVIEW

1.1 Advantages of a Graduate Degree in Electrical and Computer Engineering

A graduate degree in Electrical and Computer Engineering opens doors that are not otherwise accessible. These opportunities include research positions at corporations and national laboratories as well as teaching and research positions in academia. A career at this level brings the satisfaction of being able to explore your own ideas and fully utilize your creativity. A graduate degree will allow you to expand your knowledge and acquire new skills in analysis and problem solving, creating challenging opportunities for a full, rewarding career. Dr. Brian Kent, an MSU alumnus and retired U.S. Air Force Research Leader notes, “My USAF work experience showed me that the primary researchers, decision makers, and program managers all shared one trait … they held advanced academic degrees in engineering.”

First and foremost among the talents required to succeed in a graduate program is a desire to learn, coupled with a natural curiosity and a desire to advance the state-of-the-art. Graduate students are motivated by the enhanced independence that an advanced degree brings and the challenge of placing oneself at the forefront of technology.

We have designed this Handbook to help prospective and current graduate students select an appropriate graduate program and provide information about the educational, research and work opportunities available in the Department. We thank you for considering our graduate program. All the best in your engineering career!

NOTICE:
Deadlines for applying for admission to the Electrical and Computer Engineering Graduate Program at Michigan State University are provided in Section 3.1 of this Handbook.

The most recent version of this document and additional information can be found at: https://ece.msu.edu/academics/graduate-programs

1.2 The Electrical and Computer Engineering Graduate Program at Michigan State University

The Department of Electrical and computer Engineering offers graduate programs leading to the Master of Science and Doctor of Philosophy graduate degrees. Graduate study in the department is organized into the following seven groups:

- Computing
- Electromagnetics
- Energy and Power Systems
- Materials and Devices
- Microelectronics
- Robotics and Control
- Signal Processing and Communications
An interdisciplinary approach marks many of the research projects that faculty share with graduate students.

Our graduate program is built on the quality of our faculty, our graduate students, and the quality of their collaborative research. We believe that the background and interests of our faculty, the research facilities, and the academic excellence of our students make our department an attractive environment for graduate study. As a department, we look ahead to the future knowing that change and growth are both inevitable, and important aspects of our discipline. The department currently has approximately 55 faculty members, 850 undergraduates, and 250 graduate students, with a strong commitment to the importance of diversity among peers and faculty for the professional development of all graduate students. A graduate degree at MSU will enable you to develop the intellectual skills you need to compete among the best engineers in the world and you will receive world-class training preparing you for a fulfilling career in industry, research, or teaching.

1.3 Student Participation

The department’s graduate degree programs have certain course requirements as outlined in detail in Section 3. However, graduate students in the department quickly discover that their education is advanced in a number of ways beyond traditional coursework. One of the major opportunities is the chance to work side by side with faculty members who are deeply interested in finding answers to research problems. Most M.S. students are expected to be involved in thesis work and all doctoral students are involved in dissertation research. In addition, the department regularly sponsors seminars, which bring speakers from around the world to campus. All first-year graduate students are required to attend these seminars, and other students are encouraged to attend them. Faculty, as well as students, participate in these out-of-class learning experiences. Doctoral students demonstrate mastery of the subject matter at various levels by passing a qualifying exam and a comprehensive exam. They also develop a dissertation proposal and present the results of their research in a dissertation defense. Students are encouraged to participate in professional society meetings and to publish their research results in society journals, transactions, and conference proceedings.

Graduate students also have the opportunity to participate in academic governance at the department, college, and university levels. At the department level, a graduate student representative participates as a voting member of the Electrical and Computer Engineering Graduate Studies Committee. Electrical and Computer Engineering graduate students elect this representative from a slate of nominees, which is prepared by the graduate student body. The nominees shall be current Electrical and Computer Engineering graduate students and have completed at least one semester. This committee makes recommendations to the faculty on graduate academic standards, graduate course additions, deletions, and modifications, and graduate degree requirements. At the college level, graduate students have representation on the Engineering College Advisory Council and on the Engineering Graduate Studies Committee. At the university level, graduate students are selected and have voting membership on the University Graduate Council, Academic Council, and other such committees as specified by the University Bylaws for Academic governance.
1.4 A Road Map to Your Degree

The typical path toward a master’s degree in Electrical and Computer Engineering at Michigan State University is as follows. This path is for a master’s degree with thesis (Plan A), which is the option most often selected.

- Gain admission to the program with financial support. For most of our admitted students, the support is in the form of a graduate assistantship.
- Obtain an academic advisor (thesis chair). Your advisor will typically be a member of the department faculty and serve as both your thesis chair, and your guidance committee chair. If your advisor (thesis chair) is from another department, then another faculty member from ECE on your committee will serve as your guidance committee chair.
- Design a program of coursework with your advisor. The Master’s Degree Program Plan is to be submitted by the end of your first semester at the website (https://student.msu.edu/splash.html). See also Appendix 1 in this handbook.
- Complete the required coursework and your thesis research. The sample master’s programs in Appendix 2 outline courses and thesis work over 4 semesters, including summer. At the end of the program, the thesis is defended in an oral examination. Actual student programs often represent variations on these sample programs, with the variations representing the individual student’s interests. Most master’s degree students in our program finish within two years.
- Submission of dissertation to The Graduate School: MSU only accepts thesis and dissertations submitted electronically, as described by the web page “Thesis and Dissertation Electronic Submissions” (https://grad.msu.edu/etd/). After the final Oral Examination, revisions recommended by the faculty advisor must be made by the student to produce a final unbound thesis manuscript. If the document is satisfactory, the faculty advisor will approve it by signing the Approval Form, obtained from the Graduate School. These materials are then submitted electronically to the Graduate School, whereupon the candidate is required to complete an Exit Survey.
- Submit an Application for Graduation with the Office of the Registrar by the first week of the semester you expect to complete your degree requirements. If you complete your degree requirements during summer, apply for summer by the first week of spring semester. Both spring and summer applicants will be included in the Spring Commencement Ceremonies. The application may be done online at: https://reg.msu.edu/StuForms/GradApp/gradapp.aspx.

The typical path toward a doctorate degree in Electrical and Computer Engineering at Michigan State University is as follows.

- Gain admission to the program with financial support. For most of our admitted students, the support is in the form of a graduate assistantship.
- Obtain an academic advisor (dissertation chair). Your advisor will typically be a member of the department faculty and serve as both your dissertation chair, and your guidance committee chair. If your advisor (dissertation chair) is from another department, then another faculty member from ECE on your committee will serve as your guidance committee chair.
- Work with your advisor to form a guidance committee.
- Design a program of coursework with your guidance committee and enter your Doctoral Degree Program Plan into the Student Information System (https://student.msu.edu/splash.html) before the end of your second semester. See also Appendix 3 in this handbook.
• Pass the doctoral qualifying examination part A. Achieve a minimum average grade of 3.5 and a minimum grade of 3.0 for three Ph.D.-Qualifying Core Courses from at least 2 different areas. This must be completed within 2 years of entering the ECE Ph.D. program.

• Pass part B of the doctoral qualifying examination by the end of the Fall semester after completion of the part A qualifier.

• Pass the comprehensive examinations including a successful presentation of a dissertation proposal. This is done when coursework is finished, or substantially finished. This is recommended to be done one year before your final defense and must be done no less than 6 months before your final defense.

• Complete your research, write your dissertation, and submit it to your guidance committee a minimum of 2 weeks prior to your defense date.

• Submission of dissertation to The Graduate School: MSU only accepts thesis and dissertations submitted electronically, as described by the web page “Thesis and Dissertation Electronic Submissions” (https://grad.msu.edu/etd/). After the final Oral Examination, revisions recommended by the faculty advisor must be made by the student to produce a final unbound dissertation manuscript. If the document is satisfactory, the faculty advisor will approve it by signing the Approval Form, obtained from the Graduate School. These materials are then submitted electronically to the Graduate School, whereupon the candidate is required to complete an Exit Survey.

• Submit an Application for Graduation with the Office of the Registrar by the first week of the semester you expect to complete your degree requirements. If you complete your degree requirements during summer, apply for summer by the first week of spring semester. Both spring and summer applicants will be included in the Spring Commencement Ceremonies. The application may be done online at: https://reg.msu.edu/StuForms/GradApp/gradapp.aspx.

1.5 For Further Information

As you read this handbook, please do not hesitate to contact the department’s Associate Chairperson for Graduate Studies, any of our faculty members, or the Graduate Secretary for more information. In addition to this handbook, a number of resources are available online that can be found at: https://ece.msu.edu/academics/graduate-programs

2. PROGRAM COMPONENTS

2.1 Doctor of Philosophy Graduate Program

The Doctor of Philosophy degree consists of (1) prescribed coursework, (2) a qualifying examination (parts A and B), (3) a comprehensive examination, (4) research, (5) a dissertation, and (6) a final oral examination. Each student working toward a Doctor of Philosophy must conduct research upon which a dissertation that makes a significant contribution to knowledge is prepared and published. The research is to be under the direction of the doctoral guidance committee and acceptable to the doctoral guidance committee.
The courses prescribed by the student’s guidance committee are listed on the student’s College of Engineering Doctoral Degree Program Plan, which is approved by the student, members of the guidance committee, the Department Chairperson or designee, and the Associate Dean. Further information about the required coursework is in Section 3 of the handbook, and further information about the guidance committee formation is in Section 5 of the handbook. The final oral examination is described in Section 6.

2.1.1 The Ph.D. Qualifying Examination

Format and purpose of the Ph.D. qualifying examination: The exam shall consist of two parts. Part A will be based on graduate-level course materials. Part B will have written and oral components and will be based on a research project conducted by the student under the guidance of a faculty advisor. The overall objective of the qualifying exam is to assess a student's potential for successfully completing doctoral-level studies and research in the department. The primary objective of part A is to assess the student’s ability to prepare and grasp a broad range of fundamental topics in electrical and computer engineering. The primary objective of part B is to assess the student’s potential for addressing research problems.

Part A qualifying examination format:

1. Students are required to demonstrate proficiency in three Ph.D.-Qualifying Core Courses, chosen in consultation with their advisor.

2. These courses need to come from at least 2 different areas.

3. To demonstrate the required proficiency, the student must achieve a minimum average grade of 3.5 and a minimum grade of 3.0 for all three Ph.D.-Qualifying Core Courses counting toward the qualifier. Failing to meet the requirements will require the student to consult with the instructor of a future offering of the course(s) to determine the appropriate evaluation elements for assigning a grade, or choose another core course in consultation with their advisor so as to meet the grade requirements for the 3 Ph.D.-Qualifying Core Courses counting towards the qualifier. In consultation with the course instructor, a student who has already taken a highly similar course elsewhere can opt to participate only in the evaluation elements for a grade assignment. For Ph.D.-Qualifying Core Courses the students are not enrolled in, but are completing the appropriate evaluation elements, the instructor should report the grade at the end of the semester to the ECE Graduate Secretary and Associate Chair for Graduate Studies.

4. The student is required to complete this ECE Qualifying Exam – Part A within the first 2 years of their Ph.D. program.

5. After successful completion of the ECE Qualifying Exam – Part A, the student should fill out the ECE Qualifying Exam – Part A Form and submit it to the ECE Graduate Secretary, Meagan Kroll (krollm@egr.msu.edu) in room 2325 Engineering Building.
The Ph.D.-Qualifying Core Courses are tabulated below under the semesters they are offered.

<table>
<thead>
<tr>
<th>Area</th>
<th>Fall semester</th>
<th>Spring semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computing</td>
<td>ECE 830: Embedded Cyber-Physical Systems</td>
<td>ECE 816: Cryptography and Network Security</td>
</tr>
<tr>
<td></td>
<td>ECE 842: Performance Modeling of Communication</td>
<td>ECE 884: Deep Learning and Neural Networks</td>
</tr>
<tr>
<td>Controls &amp; Robotics</td>
<td>ECE 851: Linear Systems and Control</td>
<td>ECE 818: Robotics</td>
</tr>
<tr>
<td>Electromagnetics</td>
<td>ECE 835: Advanced Electromagnetic Fields and Waves I</td>
<td>ECE 850: Electrodynamics of Plasmas</td>
</tr>
<tr>
<td>Materials and Devices</td>
<td>ECE 874: Physical Electronics</td>
<td>ECE 875: Electronic Devices</td>
</tr>
<tr>
<td>Microelectronics</td>
<td>ECE 832: Analog Integrated Circuit Design</td>
<td></td>
</tr>
<tr>
<td>Communications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Format of part B qualifying examination: After passing part A of the exam, the Associate Chair for Graduate Studies, in consultation with the student’s major advisor, will choose a faculty supervisor and two other faculty members to evaluate part B of the exam. The faculty supervisor will assign a research topic to the student, who will research the topic, submit a written report describing his/her approach to addressing the research problem, and make an oral presentation in front of an evaluation committee. An exception in the assignment of an exam topic may be made if the student has published at least two refereed conference papers or at least one archival journal publication. In this case the student will be asked to submit a written report describing his/her contribution to the research publication(s) and make an oral presentation on the topic in front of the evaluation committee.

Also, upon recommendation of the M.S. thesis defense committee, an MSU ECE M.S. thesis and defense can be submitted in fulfillment of part B of the Ph.D. qualifier exam.

Administering of part B qualifying examination: The Part B exam committee will be composed of a minimum number of 3 faculty members, with a minimum of 2 members with >50% ECE appointment.

1. By default, the PhD guidance committee will also serve as the Part B exam committee.
2. The student’s advisor can opt out of the Part B exam committee. If the advisor opts out and the rest of the guidance committee only has one member with >50% ECE appointment, the advisor will work with the Graduate Director to identify another faculty member with >50% ECE appointment who will (only) serve on the Part B exam committee.
3. The Part B exam committee will select a Chair in administering the exam.

Evaluation of part B qualifying examination: Decisions by the committee will fall into one of the following three categories:

1. A student passes part B of the exam and is encouraged to continue in the Ph.D. program, form a guidance committee if one does not already exist, and begin preparation for the comprehensive exam and thesis research.
2. A student does not pass part B of the exam but is granted an extension, up to one month, with conditions and/or requirements specified by the committee, for satisfactory completion of part B.
3. A student does not pass part B of the exam and is asked to withdraw from the Ph.D. Program at the end of the present semester.

**Schedule of part B qualifying examination:** The student is required to complete Part B within the first two years of their Ph.D. program. The Part B exam can be taken prior to the completion of Part A.

**Time limit:** If a student leaves the graduate program after passing the qualifying examination and then wishes to reenter the doctoral program at a later date, a pass of part A and part B will be considered valid up to 5 years from the time of taking the examination.

### 2.1.2 Doctoral Comprehensive Exam and Dissertation Proposal

The intent of the Ph.D. comprehensive examinations is (a) to identify the student's proposed areas of doctoral research; (b) to assess the adequacy of the student's general preparation for the proposed research area and related fields and possibly recommend areas for additional study; and (c) to review and evaluate the content and style of the thesis proposal and the student's ability to present the ideas orally.

**Schedule of the comprehensive examination:** When the prescribed coursework is substantially complete as defined by the guidance committee, the doctoral student is eligible to take the comprehensive examinations. There must be at least a six-month period between the date when the comprehensive examinations have been successfully completed and the final dissertation defense.

**Format of the comprehensive examination:** A doctoral student's comprehensive examinations decompose into several distinct components:

- A written dissertation proposal that is prepared by the student and presented to the guidance committee for review and evaluation.
- An oral presentation of the dissertation proposal, which occurs at least two weeks after the written dissertation proposal is submitted to the guidance committee.
- An oral and/or written examination(s) to assess the student's preparation in the major and related field(s) of study for conducting the proposed research.

The guidance committee will decide whether or not this third portion of the comprehensive examinations will be written or oral and whether or not it will be conducted before, after, or at the same time as the oral presentation of the thesis proposal. Passing the comprehensive examinations shall require:

2. Satisfactory performance on the formal examination.
3. A satisfactory written dissertation proposal, a copy of which will be placed in the student's file.

**Evaluation criteria for the comprehensive examination.** The committee will consider all of the information available to it, including an interview with the student to clarify unresolved issues, and render one of the following decisions:

1. The student passes the exams and is encouraged to finish all remaining requirements at the earliest possible time.
2. The student passes the exams and, except for identified deficiencies for which the committee will prescribe a remedy, the student is encouraged to finish all remaining requirements at the earliest possible time.

3. The student fails the exams but is given permission to repeat a portion or all of them after certain conditions are met.

4. The student fails the exams and is asked to withdraw from the program at the end of the term.

Passing the comprehensive examinations requires approval of at least two thirds of the student’s guidance committee.

Appeals of the comprehensive examination evaluation: A student may appeal the guidance committee's decision. Such an appeal must be made in writing and directed to the Department Chairperson or delegate. The written appeal must contain explicit reasons for requesting that the review be conducted. The appeal must be filed within two weeks from the date the student is notified of the guidance committee's decision.

2.1.3 Doctoral Coursework

Courses will be prescribed by the guidance committee to ensure that the student has comprehensive knowledge of a major research field and related subjects. The required courses will depend upon the student's academic background in relation to the selected research specialization. For minimum Department requirements, see Section 3 of this handbook. For sample doctoral program coursework, please see Appendix 3.

2.1.4 Doctoral Research

Each student working toward a Doctor of Philosophy must conduct research upon which a dissertation that makes a significant contribution to knowledge is prepared and published. The research is to be under the direction of and acceptable to the doctoral guidance committee.

2.1.5 Doctoral Final Oral Examination

The graduate student will present the results of the thesis/dissertation in a seminar open to the community. The examination committee evaluates the seminar and defense of the thesis. For more information, see Section 6 of this handbook.

2.1.6 Doctoral Dissertation

An approved thesis/dissertation that is accepted by the graduate school becomes a single-author publication and contributes to the body of knowledge of electrical and computer engineering. Again, for more information, please see Section 6 of this handbook.
2.2 Master’s Plan A

The Master’s plan A program consists of prescribed coursework, research, a master’s thesis, and an oral defense of the master’s thesis. For more information about the prescribed coursework, please see Section 3. The oral defense is described in Section 6.

2.3 Master’s Plan B

The Master’s plan B program consists of prescribed coursework as described in Section 3, and a final evaluation of the student’s program. The final evaluation is done by the academic advisor and the Department’s Associate Chairperson for Graduate Studies.
3. DEGREE REQUIREMENTS

3.1 Admission

3.1.1 Admission Requirements

Regular admission status: Admission to a graduate degree program with regular status may be granted by the Department, subject to the availability of resources and to the approval of the Dean of Engineering, upon consideration of the likelihood that the applicant will be able to pursue a graduate program successfully without taking collateral courses. Most domestic applicants have undergraduate grade point averages of 3.5 or higher and are highly ranked in their bachelor’s class. A general profile of a successful international student applicant is as follows: graduate of a highly ranked school; in the upper 10% of their class; TOEFL scores higher than a total of 80 (19 in each category except Writing which is 22), and IELTS is 6.5 or higher (see https://ece.msu.edu/academics/admissions-graduate-studies for more details).

For admission to the Master’s program, students should have a four-year bachelor’s degree in Electrical and Computer Engineering or a closely related field. For admission to the doctoral program, students generally will have also completed the master’s degree or equivalent in Electrical and Computer Engineering. However, students with both a strong background and a strong commitment to the doctoral program may apply directly to the doctoral program without completion of a Master’s degree.

Provisional admission status: Admission to a graduate degree program with provisional status may indicate that collateral work is required or that the student’s record has not yet been fully evaluated. If collateral courses are required, the minimum acceptable grades and the semesters by which those courses must be completed will be specified on the admission form. The provisional status will be changed to regular status when the conditions specified on the admission form have been met, as determined by the Department and approved by the Dean of Engineering.

Proficiency requirement: Regardless of whether admission status is regular or provisional, students whose undergraduate degree is not in Electrical Engineering, Computer Engineering, or a closely similar area must, during their course of study, take and receive a minimum grade of 3.0 in each of three PhD Qualifying Core courses from three different areas. Students who have taken an undergraduate junior- or senior-level course closely related to a PhD Qualifying Core course in their undergraduate program can petition the Graduate Studies Committee to have the corresponding course count toward meeting the proficiency requirement.

3.1.2 Applying for Admission as a Student New to MSU Graduate Programs

Deadlines for graduate applications: Fall Semester, for full consideration for admission, financial support, university fellowships (US citizen and permanent residents only) and college fellowships (US citizens, permanent residents, and international applicants), completed applications and all required documentation must be received by December 30th of the preceding Fall term. We will continue to review applications submitted after December 30; however, we cannot guarantee full consideration of those applications. We will continue to review applications submitted after January 10th, however we cannot guarantee full consideration.
Spring Semester, completed applications and all required documentation must be received by September 15th of the preceding Fall term.

Application Materials: Note that all the following items are required for a complete application and that incomplete applications are not reviewed. The following procedure is for any student new to the MSU graduate school. For additional instructions and form access, please see the following web site: https://ece.msu.edu/academics/graduate-programs

Institution and Program Codes
Electrical & Computer Engineering – Masters: 8093
Electrical & Computer Engineering – Masters (online): 8094
Electrical & Computer Engineering – Doctoral: 8095

GRE Department Code = 1203
University Code = 1465
TOEFL Department Code = 66

i. You should submit a completed application form on-line (http://grad.msu.edu/apply/online.aspx) along with an application fee (valid for one year). Incomplete applications will not be reviewed. **Note: We will accept complete applications after these deadlines, but there is no guarantee that a late application will be processed.** Save your MSU applicant ID number and password as you will need this to upload the required documentation.

The graduate student portal allows you to check the status of your application, send e-messages to the department, upload various required documents, and request letters of recommendations. Log into the student portal with your Applicant ID and password at: https://admissions.msu.edu/GradPortal/default.aspx

ii. At the right-hand top of the page is the Application Status Log-in Box.

Admission to the department is linked to the availability of support in the form of a graduate Teaching Assistantship (TA), research assistantship (RA), fellowship, or government scholarship. For international students, support is generally in the form of a research assistantship from faculty, or a fellowship/scholarship from the applicant's government. Our admission process is a two-step process. The Graduate Admissions Committee reviews your application to decide whether your application is considered qualified for admission if support is available. Then the research faculty will review your application to decide if an RA will be offered. This decision is made by the individual faculty who has funding for RA's.

iii. Note that following items, along with the MSU application and the application fee, are required for a complete application to be considered for admissions.

1. Enter the information for your references along with their email address. They will then be automatically emailed and asked to submit letters of recommendations. You will need three references (ideally at least two should be by a college faculty who knows you well).
2. Two “official” copies of transcripts from all previous universities attended (undergraduate and graduate), as well as proof of diploma (graduate certificate) in an **unopened sealed university envelope or (domestic applicants only) e-transmitted to cliffo42@msu.edu by the university.** International students’ transcripts must be in the original language and in English, if applicable. These transcripts and certificates should be sent to:

Michigan State University  
Dept. of Electrical and Computer Engineering  
428 South Shaw Lane  
Room 2120 Engineering Building  
East Lansing, Michigan, USA  48824

MSU also does not accept transcripts that have been notarized, with the exception of countries in Eastern Europe that follow an apostille process.

Non-English Transcripts: One official copy of all records of any previous schooling (mark sheets, transcripts, diplomas, certificates, etc.) must be submitted as official documents directly from each institution. These records must show courses taken and grades earned, and **must be translated into English** if the original records are in another language. If a document is translated, it should be certified as accurate and correct by an appropriate public or school official, or sponsoring agency or government. The original record should be also included.

Admission to a program leading to a master’s or doctoral degree requires completion of a level of education comparable to a four-year U.S. bachelor’s degree. High scholastic standing and suitable preparation for the intended field of study are also considered. Normally, Michigan State University does not accept three-year bachelor’s degrees, diplomas or certificates as comparable to a four-year U.S. bachelor’s degree.

**Do not submit your original transcript, certificate, and/or diploma! MSU does not return any documents we receive.** Have your college/university make a photocopy of the documents and stamp the photocopies official. Place them in official university, sealed envelopes.

**Graduate Record Examination (GRE)** aptitude scores are required for all applicants who received their previous degree from an international institution and recommended for applicants who received their previous degree from a domestic institution. GRE test scores must be provided to us directly by the Educational Testing Service. **GRE scores are generally above 159 for the quantitative portion. GRE Verbal scores less than 146 and Analytical scores less than 3.0 will generally not be considered acceptable.**

3. **TOEFL Scores (PDF)** are required for all international applicants. Applicants are strongly urged to take the internet-based tests, not the paper-based test. **TOEFL test scores must be provided to us directly by the Educational Testing Service.** We will **not consider copies** of TOEFL scores for any reason. International applicants that have graduated from a US University, please (click here PDF) to ascertain if TOEFL is required. If you are a
citizen and live in one of the countries on this list (click here PDF), you will not need a TOEFL exam as long as the language of instruction is in English. We will also honor IELTS test scores that are sent to us by the testing agency.

TOEFL scores of a total of 80 (19 in each category except Writing which is 22), and IELTS is 6.5 or higher are required.

**English Language Proficiency Scores:** An Academic Statement and a Personal Statement are required. Please click on the appropriate statement and follow the guidelines below when completing your statements: Academic and Personal Statement Guidelines

4. Applicants with a Degree from a Chinese Institution:
   As of July 1, 2018, the China Academic Degrees and Graduate Education Development Center (CDGDC) no longer provides verification reports of postsecondary program participation or completion information and transcripts from China. Currently the CDGDC only offers individuals who completed postsecondary degree programs in mainland China (excluding Hong Kong, Taiwan, and Macao) an electronic verification report of the diploma that was awarded. This report is in Chinese only. The China Higher Education Student Information and Career Center (CHESICC), however, provides an electronic verification report of Chinese undergraduate transcripts, in Chinese and English.

   Starting Spring 2019, Michigan State University requires admitted Chinese students who earned bachelor’s degrees in mainland China to submit a degree conferral verification report from the CDGDC and a transcript verification report from CHESICC. Both of these reports must be made available electronically to MSU’s Office of Admissions.

   **Application and Admission** – Chinese students who earned bachelor’s degrees from mainland China will need to submit ALL available official academic records (e.g., transcripts and diplomas earned, in Chinese and English, or English if issued that way) as part of their application for admission. It is the department’s responsibility to inform students of the CDGDC/CHESICC requirement prior to admission. **After** admission, students will be informed via email they need to satisfy the CDGDC/CHESICC requirement.

   **Degree Verification** – Admitted MSU graduate students who completed postsecondary undergraduate degree programs in mainland China must contact the CDGDC and request an electronic degree verification report. This report must be 1) emailed directly to the Office of Admissions from the CDGDC or 2) the CDGDC verification report application number emailed to the Office of Admissions by the student or the CDGDC. The Office of Admissions email address is: admis@msu.edu

   **Transcript Verification** – Admitted MSU students who completed postsecondary undergraduate degree programs in mainland China must contact CHESICC and request an electronic transcript verification report in English. The report must include an official
copy of the final transcript (in Chinese and English, or just English) along with an English version of the report, which includes all courses taken, program start and end dates, etc. This report must be sent electronically via Parchment directly to the Office of Admissions from CHESICC.

**Deadline** – The CDGDC and CHESICC electronic reports are due to the Office of Admissions **AFTER** admission and **no later than the middle of the first semester of enrollment**.

**Applicants with Fellowships/Scholarships**

If you have an external fellowship or scholarship of some kind, you should email cliffo42@egr.msu.edu with information about the fellowship/scholarship, including:

- The name of the fellowship/scholarship (e.g., Fulbright)
- The dates the fellowship/scholarship will cover (e.g., August 2015-August 2016)
- The amount of support provided by the fellowship/scholarship (e.g., tuition and fees or $25,000/year).

**Admission Requirements**

- Students should have a four-year bachelor's degree in Electrical Engineering or a closely related field.
- A graduate assistantship, fellowship, or scholarship should be available to the applicant.
- Successful domestic applicants are highly ranked in their bachelor's class. Most successful domestic applicants have GPA's of 3.5 or better. Domestic applicants with GPA less than 3.2 are generally not considered for admission.
- A general profile of a successful international student applicant is as follows.
  - Graduate of a highly ranked school.
  - In the upper 10% of their class.
- **International MS applicants must submit an Affidavit of Support if they wish to pay for their own education.** This procedure must include the Affidavit of Support form and a bank statement. This statement must be in English. The account holder’s name should be on the Affidavit of Support form and it amount must meet our funding requirement. Financial proof must be provided in order to comply with U.S. Government regulations. Final admission is not granted until the Office of Admissions is satisfied that all documents are complete and correct. At that time your immigration document will be issued. [Affidavit of Support form and information (PDF)].

If you have any further questions, please email Linda Clifford at cliffo42@msu.edu.
3.1.3 Applying for Transfer to Electrical and Computer Engineering from Another MSU Graduate Program

The expected qualifications for current MSU graduate students seeking to transfer to a M.S. or Ph.D. program in Electrical and Computer Engineering (ECE) are similar to the qualifications expected for applicants applying to the program in general. Department proficiency requirements, support requirements, and application deadlines also apply. However, the application procedure is different because the applicant is already a student at MSU.

Application Procedure for transfer from another MSU graduate program:

Fill out a paper copy of the MSU “Application for Admission to Graduate Study”. Do not send this to the Admissions Office since you are already a student at MSU. Also, do not include any fee. Instead, write “Transfer” on top of the form. Include the items below with your application to the Electrical and Computer Engineering Graduate Program.

1. The paper copy of the MSU application.
2. Official transcripts from schools attended other than MSU.
3. Proof of GRE and TOEFL scores if you are an international student.
4. Three recommendation forms must be completed by instructors or supervisors familiar with the applicants work. Submit the names and contact information for letters of recommendation through the graduate student portal at: https://admissions.msu.edu/GradPortal/default.aspx
5. A statement of purpose as described on the ECE webpage regarding instructions for applying to graduate school.

The ECE Graduate Admissions, Recruitment, and Financial Aid Committee (GARFAC) will consider the application after all items 1 through 5 are received.

Support and Degree Requirements for transfer from another MSU graduate program:

Admission is tied to Department financial support in the form of fellowships or graduate assistantships. All degree requirements described in this Handbook must be met. In addition to the regular degree requirements, the following applies for students transferring from another MSU graduate program.

- At least 12 credits of the program must involve courses for which a grade has not yet been received prior to admission.
- An ECE advisor must be assigned and a second M.S. program must be filed before half the required minimum of 21 credits of related ECE course materials are completed.
- Regardless of whether admission status is regular or provisional, students whose undergraduate degree is not in Electrical Engineering, Computer Engineering, or a closely similar area must, during their course of study, take and receive a minimum grade of 3.0 in each of three PhD Qualifying Core courses from three different areas. Students who have taken an undergraduate junior- or senior-level course closely related to a PhD Qualifying Core course in their undergraduate program can petition the Graduate Studies Committee to have the corresponding course count toward meeting the proficiency requirement.
3.1.4 Applying for a Second, Joint, or Dual Master’s Degree from MSU

The expected qualifications for current MSU graduate students seeking admission for a second, joint, or
dual M.S. degree in Electrical and Computer Engineering (ECE) are similar to the qualifications expected
for applicants seeking a M.S. in ECE in general. Department proficiency, support requirements, and
application deadlines also apply. However, the application procedure is different because the applicant is
already a student at MSU.

Application procedure for a second master’s degree:

Fill out a paper copy of the MSU “Application for Admission to Graduate Study”. Do not send this to the
Admissions Office since you are already a student at MSU. Also, do not include any fee. Instead, write
“Second Masters” on top of the form. Include the items below with your application:

1. The paper copy of the MSU application.
2. Official transcripts from schools attended other than MSU.
3. Proof of GRE and TOEFL scores if you are an international student.
4. Three recommendation forms completed by instructors or supervisors familiar with the applicants
   work. Submit the names and contact information for letters of recommendation through the
   graduate student portal at: https://admissions.msu.edu/GradPortal/default.aspx
5. A statement of purpose as described on the ECE webpage regarding instructions for applying to
   graduate school.
6. A letter of support from your faculty advisor or graduate coordinator in your current major
department.

The ECE Graduate Admissions, Recruitment, and Financial Aid Committee (GARFAC) will consider the
application after all items 1 through 6 are received.

Support and Degree Requirements for second, joint, and dual master’s degrees:

Admission is tied to department financial support in the form of fellowships or graduate assistantships.
Exceptions are provided for comparable support from external scholarships or fellowships for graduate
study in Electrical and Computer Engineering, and for doctoral students supported in their major
department. All degree requirements described in this handbook must be met. In addition to the regular
degree requirements, the following applies for second, joint, and dual master’s degree programs.

- The master’s plan must include at least 21 credit hours of material related to electrical and
  computer engineering and not included in the student’s other graduate degree program.
- At least 12 credits of the program must involve courses for which a grade has not yet been
  received prior to admission.
- An ECE advisor must be assigned and a second M.S. program must be filed before half the
  required 21 credits of related ECE course materials are completed.
- Regardless of whether admission status is regular or provisional, students whose undergraduate
degree is not in Electrical Engineering, Computer Engineering, or a closely similar area must,
during their course of study, take and receive a minimum grade of 3.0 in each of three PhD
Qualifying Core courses from three different areas. Students who have taken an undergraduate
junior- or senior-level course closely related to a PhD Qualifying Core course in their
undergraduate program can petition the Graduate Studies Committee to have the corresponding course count toward meeting the proficiency requirement.

3.1.5 Applying for a Dual Major Doctoral Degree from MSU

Under Michigan State University guidelines, doctoral degrees can be designed across disciplines/graduate programs with the concurrence of the graduate programs involved (see “Dual Major Doctoral Degrees” in the MSU publication Academic Programs). All dual major doctoral degrees must be approved by the Dean of the Graduate School. A request for the dual major degree must be submitted within one semester following its development and within the first two years of the student’s enrollment at MSU. For further information regarding dual major doctoral degrees where one of the majors is Electrical and Computer Engineering, please see Appendix 4 of this handbook.

3.2 Department Admission Selection Process

The admission selection process is a two-step process that is tied both to the qualifications of the applicant and to the availability of graduate assistantships and fellowships. As a first step, the Department’s Graduate Admissions, Recruitment, and Financial Aid Committee (GARFAC) reviews each complete application with regard to whether the background indicates the likelihood of a positive experience in the graduate program. This decision is based on a number of considerations including the previous educational institution, courses of study at that institution, rank in class, GRE and TOEFL scores, and references.

If the applicant’s background is considered to be compatible with the program, then in the second step of the admission process the candidate is considered for financial support. It is the general policy of the department to only offer admission if full support in the form of a graduate assistantship or fellowship is available. This may include fellowships or scholarships from other organizations. Identifying such support constitutes the second step of the admission process. Faculty review the candidates with regard to offering a research assistantship and GARFAC reviews the candidates with regard to teaching assistantship and fellowship offers.

3.3 Requirements for the Master’s Degree (Plan A)

The Plan A master’s degree consists of prescribed coursework, research, thesis, and a final oral examination.

Master’s credit requirements: The student must complete at least 30 credits at the 400 level or higher. At least 20 of these credits, including the thesis credits, must be at the 800 level or higher. In addition, credit requirements for core-courses, supporting courses, and the master’s thesis must be met. Courses below the 400 level may not be counted toward the requirements of the degree. Please see Appendix 2 for a work sheet to help plan your course of study for the M.S. in Electrical Engineering. The allocation of the credits is described as follows.
Master’s ECE courses: Students are required to take a minimum of four ECE courses (12 credits minimum) at the 800 or 900 level, not including ECE 801. These courses must include at least two classes from the following list of core courses:

- ECE 821: Advanced Power Electronics and Applications
- ECE 830: Embedded Cyber-Physical Systems
- ECE 835: Advanced Electromagnetic Fields and Waves I
- ECE 842: Performance Modeling of Communication Networks
- ECE 851: Linear Control Systems
- ECE 863: Analysis of Stochastic Systems
- ECE 874: Physical Electronics

Master’s supporting classes: At least two classes (6 credits minimum) of supporting classes outside of the Engineering College are required in areas such as Mathematics, Statistics, and Physics. Examples of approved courses are as follows:

- MTH 415, 421, 425, 428H, 451, 452, 461
- MTH 810, 828, 829, 841, 842, 848, 849, 850, 851, 852, 881
- STT 441, 442, 844, 861, 862, 875
- PHY 471, 472, 810, 841, 842, 851, 852

Master’s thesis credit requirements: At least 4 credits and no more than 8 credits of ECE 899 are required.

Master’s transfer credits: As many as 9 semester credits of graduate coursework (excluding research and thesis credits) may be transferred into a 30 credit master’s degree program from other accredited institutions or international institutions of similar quality if they are appropriate to a student’s program and provided they were completed within the time limits for the degree. Such courses must have been taken while enrolled in a graduate degree program or while dual-enrolled in a graduate program and an undergraduate program. Courses taken in an undergraduate program are not transferable. An undergraduate program is one in which the degree granted is a bachelor’s degree, regardless of the number of credits or years.

See the MSU Academic Programs publication for additional information. If you wish to transfer credits, see the Associate Chairperson for Research and Graduate Studies at the beginning of the program so that an MSU Credit Evaluation form can be initiated. (See the “Supplement Form.pdf” at https://ece.msu.edu/academics/graduate-programs).

As a member of the Michigan Coalition for Engineering Education (MCEE), MSU will accept up to one less than half of the course credits required for the M.S. degree program in transfer from other MCEE member institutions provided that (1) the student earned a grade of at least 3.0 or equivalent in the related courses; (2) the credits were not earned in research or thesis courses; and (3) the total number of credits accepted in transfer from MCEE member institutions or from other institutions does not exceed one less than half of the credits required.

Master’s seminar requirement: First year graduate students are required to attend 7 seminars from the graduate seminar series. When possible, video recordings of the seminars will be provided for online students (major code: 8094) through a Desire to Learn (D2L) website.
**Proficiency requirement:** Regardless of whether admission status is regular or provisional, students whose undergraduate degree is not in Electrical Engineering, Computer Engineering, or a closely similar area must, during their course of study, take and receive a minimum grade of 3.0 in each of three PhD Qualifying Core courses from three different areas. Students who have taken an undergraduate junior- or senior-level course closely related to a PhD Qualifying Core course in their undergraduate program can petition the Graduate Studies Committee to have the corresponding course count toward meeting the proficiency requirement.

**Master’s degree program plan filing:** The student's program of study must be approved before the student completes 6 credits of graduate work in order for the student to continue to enroll in the master's degree program. For any independent study or selected topics course that is included in the student's approved program of study, the subject material and the instructor must be specified. The academic adviser for each student will assist the student in planning a program satisfactory to the needs of the student. Changes in program plans may be made only with the approval of the adviser, the ECE Associate Chairperson for Graduate Studies, and the Associate Dean for Research and Graduate Studies. Please see Appendix 1 for guidance on planning a program in various areas of graduate study in electrical engineering. Also, please see Appendix 2 for worksheets that you may use in planning your program, and an illustration of a Master’s Degree Program Plan. When you are ready to file your program, provide the information in the Student Information System (SIS) at https://student.msu.edu/splash.html. A form will be generated and electronically circulated to the graduate secretary, then your advisor, and then to the other signatories.

**Modifications to the master’s program:** The student’s approved program of study may be modified and recirculated through the approval process, however courses in the program plan may not be deleted for which a grade has already been assigned under any of the three grading systems (numerical, Pass-No Grade, or Credit-No Credit). Appendix 2 also illustrates the change of a particular Master’s degree program.

**Residency requirement for the Master’s degree:** At least 9 credits must be taken in residence. This requirement is waived for online students (major code: 8094).

**Time limit for the Master’s degree:** The time limit for the completion of the requirements for the master's degree is five calendar years from the date of enrollment in the first course included for degree certification.

**Grade point average for graduation:** The Engineering College requires a minimum GPA of 3.0 for courses on the approved Master’s degree program plan. The University requires a minimum total GPA of 3.0. The total GPA may be different than the program GPA if classes were taken that was not listed on the program. For DF-Deferred grades, the required work must be completed and a grade reported within 6 months with the option of a single six-month extension. If the required work is not completed within the time limit, the DF will become U-Unfinished and will be changed to DF/U under the numerical and Pass-No Grade (P-N) grading systems, and to DF/NC under the Credit-No Credit (CR-NC) system. This rule does not apply to graduate thesis or dissertation work.

**Master’s degree examinations:** The student is required to pass an oral examination in defense of the thesis. Section 6 of the handbook describes this examination.
Master’s thesis distribution: A thesis formatting guide is provided through the Graduate School website at: [https://grad.msu.edu/etd/formatting-guide](https://grad.msu.edu/etd/formatting-guide). MSU only accepts theses and dissertations submitted electronically, as described by the web page “Thesis and Dissertation Electronic Submissions” ([https://grad.msu.edu/etd/](https://grad.msu.edu/etd/)). After the final Oral Examination, revisions recommended by the faculty advisor must be made by the student to produce a final unbound thesis manuscript. If the document is satisfactory, the faculty advisor will approve it by signing the Approval Form, obtained from the Graduate School. These materials are then submitted electronically to the Graduate School, whereupon the candidate is required to complete an Exit Survey.

The target date for the FINAL APPROVAL of an electronic Thesis or Dissertation to the Graduate School for graduating the semester of that submission is FIVE working days prior to the first day of classes for the next semester. Submission via ProQuest does not mean that the document has been ACCEPTED. The review process is interactive and final approval can take anywhere from a few hours to weeks, depending upon the extend of the necessary revisions and how diligent the author is when making the necessary revisions. Graduation on the semester of the electronic submission is only guaranteed if the document is APPROVED on or before the target date for that semester.

Students are responsible for all dissertation preparation and expenses. Departmental equipment or materials may not be used for this purpose.

**Final semester:** Submit an Application for Graduation with the Office of the Registrar by the first week of the semester you expect to complete your degree requirements. If you complete your degree requirements during summer, apply for summer by the first week of spring semester. Both spring and summer applicants will be included in the Spring Commencement Ceremonies. The application may be done online at: [https://reg.msu.edu/StuForms/GradApp/gradapp.aspx](https://reg.msu.edu/StuForms/GradApp/gradapp.aspx).

Commencement information can be obtained from [https://commencement.msu.edu/](https://commencement.msu.edu/).

Departing students are required to complete the Exit/Destination Survey ([https://www.egr.msu.edu/masters/survey/](https://www.egr.msu.edu/masters/survey/)), and to fill out the Termination-Separation Checklist ([https://www.hr.msu.edu/ua/leaving-msu/documents/TerminationChecklist.pdf](https://www.hr.msu.edu/ua/leaving-msu/documents/TerminationChecklist.pdf)). The checklist is provided to highlight the range of issues that may need to be addressed when terminating MSU employment or otherwise separating from a department. The research advisor and graduate secretary must sign the checklist.

### 3.4 Requirements for the Master’s Degree (Plan B)

The Plan B master’s degree consists of prescribed coursework and a final evaluation. All requirements from Plan A apply to plan B except that (1) a minimum of 18 credits must be in courses at the 800-900 level and (2) those requirements specifically related to the thesis do not apply. The final evaluation is performed by the student’s academic advisor and the Department’s Associate Chairperson for Graduate Studies.
3.5 Requirements for the Doctor of Philosophy Degree

The Doctor of Philosophy degree consists of prescribed coursework, a qualifying examination, a comprehensive examination, research, a dissertation, and a final oral examination. Each student working toward a Doctor of Philosophy must conduct research upon which a dissertation that makes a significant contribution to knowledge is prepared and published. The research is to be under the direction of and acceptable to the doctoral guidance committee.

Doctoral guidance committee: Each graduate student admitted to the doctoral program has the responsibility to form a guidance committee with the approval and the assistance of the Department chairperson or designated representative. Section 5 of the handbook provides additional information regarding the guidance committee.

Course credit requirements: The doctoral program must minimally include thirty-six (36) semester credits, in addition to ECE 999 and exclusive of any independent study credits, beyond the B.S. degree in 800/900 level courses. To ensure breadth, a minimum of three (3) of these credits must be taken outside the Engineering College in consultation with the guidance committee. All such courses must be taken under the numerical grading system, with the exception that up to three (3) Master's thesis credits may be applied to the Ph.D. course requirement. Courses will be prescribed by the guidance committee to ensure that the student has a comprehensive knowledge of a major research field and related subjects. The required courses will depend upon the student's academic background in relation to the selected research specialization.

Doctoral dissertation credit requirements: In addition to the minimal 36 credits prescribed by the guidance committee, the student must register for and successfully complete 24 credits of doctoral dissertation research, course number ECE 999.

Transfer credits: The guidance committee may, in considering the Department doctoral course credit requirements, count courses taken in graduate programs at other institutions of similar quality if they are appropriate to the student’s program and provided they were completed within the time limits approved for earning the degree. Such courses must be documented for Department records and the documentation must be included with the doctoral plan of study. It is not necessary to formally transfer such credits and they are not listed on the College of Engineering Doctoral Degree Program Plan. Instead, such courses are listed on the Department’s Supplement to the Report of the Guidance Committee and listed in the Comments section in the Student Information System. This supplement should also list graduate courses taken in other graduate degree programs at MSU that the guidance committee wishes to count toward the Department’s doctoral course credit requirements. Such courses must have been taken while enrolled in a graduate degree program or while dual-enrolled in a graduate program and an undergraduate program. Courses taken in an undergraduate program should not be listed on the Supplementary Report. An undergraduate program is one in which the degree granted is a bachelor’s degree, regardless of the number of credits or years.

Seminar requirement: First year graduate students are required to attend 7 seminars from the graduate seminar series.

Proficiency requirement: Regardless of whether admission status is regular or provisional, students whose undergraduate degree is not in Electrical Engineering, Computer Engineering, or a closely similar area
must, during their course of study, take and receive a minimum grade of 3.0 in each of three PhD Qualifying Core courses from three different areas. Students who have taken an undergraduate junior- or senior-level course closely related to a PhD Qualifying Core course in their undergraduate program can petition the Graduate Studies Committee to have the corresponding course count toward meeting the proficiency requirement.

**Doctoral program filing:** The student’s program of study shall be submitted as a Guidance Committee report for approval to the Department and to the Dean by no later than the end of the student’s second semester of enrollment in the doctoral program. For any selected topics course that is included in the student’s program of study the subject material and the instructor must be specified. The student’s program of study must be approved in order for the student to continue to enroll in the doctoral degree program beyond the second semester.

Please see Appendix 3 for worksheets that you may use in planning your doctoral program, and an illustration of a Doctoral Degree Program Plan. When you are ready to file your program, enter it into the Student Information System and it will be routed for approvals, starting with the graduate secretary, then your advisor, your guidance committee, and then the other signatories.

**Modifications to the doctoral program:** The student’s approved program of study may be modified and recirculated through the approval process, however courses in the program plan may not be deleted for which a grade has already been assigned under any of the three grading systems (numerical, Pass-No Grade, or Credit-No Credit).

**Doctoral degree time limit:** The comprehensive examination must be passed within five years and all the remaining requirements for the degree must be completed within eight years from the time when a student begins the first day of the first class at MSU that appears on his or her doctoral program of study. Application for extensions of the above deadlines must be submitted prior to the deadline by the Department for approval by the Dean of Engineering and by the Dean of the Graduate School. Upon approval of the extension, the doctoral comprehensive examinations must be passed again. To initiate the deadline waiver request, contact the ECE Associate Chair for Graduate Studies.

**Grade point average for graduation:** The Engineering College requires a minimum GPA of 3.0 for courses on the approved doctoral degree program. The University requires a minimum total GPA of 3.0. The total GPA may be different than the program GPA if classes were taken that was not listed on the program. For DF-Deferred grades, the required work must be completed and a grade reported within 6 months with the option of a single six-month extension. If the required work is not completed within the time limit, the DF will become U-Unfinished and will be changed to DF/U under the numerical and Pass-No Grade (P-N) grading systems, and to DF/NC under the Credit-No Credit (CR-NC) system. This rule does not apply to graduate thesis or dissertation work.

**Doctoral examinations:** The student is required to pass the qualifying examination, the comprehensive examination, and a final oral examination in defense of the dissertation. Please see section 2 of this handbook for further information regarding the qualifying and comprehensive examinations, and section 6 for information regarding the dissertation defense.

**Doctoral dissertation distribution:** A dissertation formatting guide is provided through the Graduate School website at: [https://grad.msu.edu/etd/formatting-guide](https://grad.msu.edu/etd/formatting-guide). MSU only accepts theses and dissertations
submitted electronically, as described by the web page “Thesis and Dissertation Electronic Submissions” (https://grad.msu.edu/etd/). After the final Oral Examination, revisions recommended by the faculty advisor must be made by the student to produce a final unbound thesis manuscript. If the document is satisfactory, the faculty advisor will approve it by signing the Approval Form, obtained from the Graduate School. These materials are then submitted electronically to the Graduate School, whereupon the candidate is required to complete an Exit Survey.

The target date for the FINAL APPROVAL of an electronic Thesis or Dissertation to the Graduate School for graduating the semester of that submission is FIVE working days prior to the first day of classes for the next semester. Submission via ProQuest does not mean that the document has been ACCEPTED. The review process is interactive and final approval can take anywhere from a few hours to weeks, depending upon the extend of the necessary revisions and how diligent the author is when making the necessary revisions. Graduation on the semester of the electronic submission is only guaranteed if the document is APPROVED on or before the target date for that semester.

Students are responsible for all dissertation preparation and expenses. Departmental equipment or materials may not be used for this purpose.

**Final semester:** Submit an Application for Graduation with the Office of the Registrar by the first week of the semester you expect to complete your degree requirements. If you complete your degree requirements during summer, apply for summer by the first week of spring semester. Both spring and summer applicants will be included in the Spring Commencement Ceremonies. The application may be done online at: [https://reg.msu.edu/StuForms/GradApp/gradapp.aspx](https://reg.msu.edu/StuForms/GradApp/gradapp.aspx).

Commencement information can be obtained from [https://commencement.msu.edu/](https://commencement.msu.edu/).

Departing students are required to complete the Exit/Destination Survey (https://www.egr.msu.edu/masters/survey/), and to fill out the Termination-Separation Checklist ([https://www.hr.msu.edu/ua/leaving-msu/documents/TerminationChecklist.pdf](https://www.hr.msu.edu/ua/leaving-msu/documents/TerminationChecklist.pdf)). The checklist is provided to highlight the range of issues that may need to be addressed when terminating MSU employment or otherwise separating from a department. The research advisor and graduate secretary must sign the checklist.

### 3.6 Readmission Process

Students whose enrollment at Michigan State University is interrupted for more than three consecutive terms (including summer); whose last enrollment ended with recess or dismissal; or who have completed their academic program, need to submit an application for readmission. This application should be submitted at least one month prior to the beginning of the term in which the student expects to resume studies. For further information, see the Office of the Registrar’s web site: [https://reg.msu.edu/StuForms/Readmission/Readmission.aspx](https://reg.msu.edu/StuForms/Readmission/Readmission.aspx)

Readmission to the Electrical and Computer Engineering graduate program may depend on the availability of an academic advisor and the availability of a graduate assistantship. Thus, a student seeking readmission is advised to first check with the academic advisor regarding these matters.
3.7 Full-Time Status

In order to be considered full time for academic purposes, a student must carry the minimum number of credits per semester as defined below:

- Master's level: 9 credits,
- Doctoral level: 6 credits,
- Graduate–Professional level: 12 credits.

All graduate assistants are classified as full-time students during the semester(s) of their appointments as long as they are enrolled for the minimum required credits for the assistantship (see Section 10.5 of this handbook). Full time status for doctoral students is defined as a minimum of 1 credit for those students who:

1. Have successfully completed all comprehensive exams and are actively engaged in dissertation research; or
2. Are doing department-approved off-campus fieldwork related to preparation of their dissertation.

4. SELECTION OF THESIS/DISSERTATION ADVISOR

Graduate education, research, and creative activities take place within a community of scholars where constructive relationships between graduate students and their advisors and mentors are essential for the promotion of excellence in graduate education and for adherence to the highest standards of scholarship, ethics, and professional integrity. Initiation and successful completion of independent research requires early and continued advice and oversight by a faculty advisor.

For students in the Electrical and Computer Engineering doctoral graduate program, an ECE faculty (> 50% appointment in ECE) advisor (dissertation chair) is the guidance committee chairperson (chair) as well as the academic advisor. That faculty member is the ‘major professor’ for the student. For students in the Electrical and Computer Engineering master’s graduate program, plan A, the ECE faculty advisor is the student’s academic advisor and thesis advisor (dissertation chair). For plan B master’s students, the faculty advisor is the academic advisor. For ECE graduate students with a faculty advisor (dissertation chair) who has a < 50% appointment in the Electrical and Computer Engineering Department, one of the guidance committee members with > 50% appointment in ECE will be assigned as the guidance committee chairperson (chair) for the purpose of properly following the ECE Graduate Handbook requirements for the degree and for managing all required ECE paperwork associated with the ECE student’s program.

4.1 Timeline for Selection of a Permanent Faculty Advisor
All students in the electrical engineering graduate program must have a faculty advisor. Master’s degree students are to have selected a permanent advisor prior to the completion of 6 credits in their master’s degree program. Doctoral students must select a permanent advisor prior to the completion of two semesters. Many students will have selected an advisor prior to beginning their program. The Associate Chairperson for Graduate Studies will serve as the advisor for Plan B Master’s Students and can serve as a temporary advisor for students seeking a permanent advisor.

4.2 Advisor Selection Process

Students who are admitted to the electrical engineering graduation program with a research assistantship that is provided by a particular faculty member will have that faculty member as their academic advisor and thesis/dissertation advisor. Other students may be admitted with a graduate assistantship or fellowship that is from general funds or third-party funds and not explicitly tied to a particular faculty member. In those cases, the selection of an advisor is based on mutual research interests. It is also generally based on intent of the faculty member to provide financial support after the general funds support ends, assuming availability of funds and satisfactory performance. The Department’s policy is to establish that there is indeed such interest from at least one faculty member prior to sending a letter of admission. When more than one faculty member has expressed interest in serving as academic advisor to a student who was admitted with an assistantship or fellowship from general funds or third parties, the student should select an advisor within the time frame described in the previous section. Faculty research interests can be found at the department website (https://ece.msu.edu/).

4.3 Roles and Responsibilities of the Thesis/Dissertation Advisor

The role of the advisor includes the following:

- Ensuring that graduate students receive information about requirements and policies of the graduate program.
- Advising graduate students on developing a program plan, including appropriate coursework, research or creative activity, and on available resources.
- Advising graduate students on the selection of a thesis or dissertation topic with realistic prospects for successful completion within an appropriate time frame and on the formation of a guidance committee.
- Providing training and oversight in creative activities, research rigor, theoretical and technical aspects of the thesis or dissertation research, and in professional integrity.
- Encouraging graduate students to stay abreast of the literature and cutting-edge ideas in the field.
- Helping graduate students to develop professional skills in writing reports, papers, and grant proposals, making professional presentations, establishing professional networks, interviewing, and evaluating manuscripts and papers.
- Providing regular feedback on the progress of graduate students toward degree completion, including feedback on research or creative activities, coursework, and teaching, and constructive criticism if the progress does not meet expectations.
- Helping graduate students develop into successful professionals and colleagues, including encouraging students to participate and disseminate results of research or creative activities in the appropriate scholarly or public forums.
• Facilitating career development, including advising graduate students on appropriate job and career options, as well as on the preparation of application materials for appropriate fellowship, scholarship, and other relevant opportunities.
• Writing letters of reference for appropriate fellowship, scholarship, award, and job opportunities.
• Providing for supervision and advising of graduate students when the faculty advisor is on leave or extended absence.

4.4 Roles and Responsibilities of the Student

The student also has responsibilities in the advisor/student relationship. These include the following:
• Learning and adhering to University and academic unit rules, procedures, and policies applicable to graduate study and research or creative activities, including those outlined in the publications Academic Programs, Graduate Student Rights and Responsibilities, and Academic Freedom for Students at MSU.
• Meeting University and academic unit requirements for degree completion.
• Forming a guidance committee that meets University requirements as well as requirements that are outlined in the Graduate Handbook of the academic unit.
• Following disciplinary and scholarly codes of ethics in coursework, thesis or dissertation research, and in creative activities.
• Practicing uncompromising honesty and integrity according to University and federal guidelines in collecting and maintaining data.
• Seeking regulatory approval for research in the early stages of thesis or dissertation work where applicable.
• Keeping the faculty advisor and guidance committee apprised on a regular basis of the progress toward completion of the thesis or dissertation.

4.5 Change of Advisors

Once a permanent thesis/dissertation advisor is selected, it is unusual to change advisors. However, if a situation arises where a change seems imperative, the student should consult with the department’s Associate Chairperson for Graduate Studies who will facilitate changes of faculty advisor.

5. FORMATION OF THE GUIDANCE COMMITTEE

Each graduate student admitted to the doctoral program has the responsibility to form a guidance committee with the approval and the assistance of the department chairperson or designated representative. The guidance committee will consist of at least four Michigan State University regular faculty, including the committee chairperson. The committee chairperson is also the student’s academic advisor. At least two members of the guidance committee shall have a > 50% appointment in the
Electrical and Computer Engineering Department and a least one member shall be from a different academic department at Michigan State University with < 50% appointment in the Electrical and Computer Engineering Department. Please see the MSU Academic Programs publication for additional information regarding definition of regular faculty. For ECE graduate students with a faculty advisor (dissertation chair) who has a < 50% appointment in the Electrical and Computer Engineering Department, one of the guidance committee members with > 50% appointment in ECE will be assigned as the guidance committee chairperson (chair) for the purpose of properly following the ECE Graduate Handbook requirements for the degree and for managing all required ECE paperwork associated with the ECE student’s program.

The responsibilities of the guidance committee include the following.
- Advising graduate students on coursework, research, or creative activities.
- Providing at least annually feedback and guidance concerning progress toward the degree.
- Administering the comprehensive exams and the final oral exam in a fair and professional manner.
- Reviewing the thesis or dissertation in a timely, constructive and critical manner.
- Committee chairpersons on leave shall provide for the necessary guidance of their advisees during their absence.

6. THESIS/DISSERTATION DEFENSE AND FINAL ORAL EXAMINATION

6.1 Nature and Scope of the Thesis/Dissertation

The final master’s or doctoral examination is the culmination of a student’s graduate education and training and reflects not only the accomplishments of the graduate student but also on the quality of the graduate program. An approved thesis/dissertation that is accepted by the graduate school becomes a single-author publication and contributes to the body of knowledge of electrical and computer engineering.

6.2 Examination Regulations and Format

The graduate student will present the results of the thesis/dissertation in a seminar open to the community. The student should arrange a suitable examination date after consulting with the thesis advisor and members of the examination committee. The student should also arrange for a suitable room in which to hold the seminar by consulting with the office staff of the Electrical and Computer Engineering Department. This should be done in communication with the Department graduate secretary, who will arrange for announcement of the upcoming defense. The announcement should be formatted according to a standard template (see Appendix 5) and should include a title, student’s and advisor’s name and affiliation, dissertation abstract and a list of creative works that resulted from the student’s doctoral research.
For both the master’s degree candidate and doctoral candidate, the following regulations apply.

- The final oral examination must be scheduled for a date not earlier than two weeks after the dissertation and abstract have been submitted to the chairperson of the guidance committee, other guidance committee members, and any appointed examiner.
- The student must be registered during the semester in which the final oral examination is taken.
- The dissertation and the student’s performance on the final oral examinations must be approved by a positive vote of at least three-fourths of the voting examiners and with not more than one dissenting vote from among the Michigan State University regular faculty members of the guidance committee.

For both the master’s degree candidate and doctoral candidate, the following format is typical. The examining committee members may or may not choose to meet before the exam to discuss the procedure. The candidate presents the results in seminar fashion and responds to questions and comments from those in attendance. After the general audience has had opportunity to raise questions and comments, they are excused from the room and the defense continues with only the examining committee. At the end of the examination, the student is asked to step out of the room, and the examining committee members each indicate in writing a pass or fail grade. The student is then asked to enter the room to receive the result of the final examination. A summary report of the examination result is submitted to the Dean of Engineering and the Chairperson of the Department.

6.3 Master’s Degree Examining Committee

The examination committee consists of at least three Michigan State University regular faculty members, at least two of whom must be on the faculty of the Department of Electrical and Computer Engineering. The committee is selected by the thesis advisor and student with the approval of the Department’s Associate Chairperson for Graduate Studies. One member of the committee must be the thesis advisor. Other interested faculty members may attend the examination without vote.

6.4 Doctor of Philosophy Degree Examining Committee

The doctoral final oral examination committee consists of the student’s guidance committee. According to University policy, at the discretion of the Dean of Engineering, the guidance committee may be augmented by one appointed faculty member. Other interested faculty members may attend the examination without vote.

6.5 ProQuest and ORCID

Requests for Hold/Embargo on Publication of Documents Submitted to ProQuest: Students submitting a thesis/dissertation to ProQuest now can request a hold/embargo of publication by ProQuest by contacting the Graduate School at msutds.approval@grd.msu.edu or calling (517) 353-3220. In response to the request, the Graduate School will send directly to the student a form that needs to be completed and turned in to the Graduate School prior to the document submission to ProQuest. The form needs to be signed by the student’s major professor and by the Associate Dean of the student’s college. The request
for the hold/embargo may be for six months, one year, or two years. Requests for a period longer than six months must include a brief justification for the length of the requested hold/embargo.

Creating an Open Researcher and Contributor ID (ORCID) at the Time of Submission of Electronic Documents to ProQuest: At the time of submission to ProQuest, authors now have the opportunity to create an ORCID that provides researchers with a unique identifier for linking their research outputs and activities. An ORCID:

- Improves recognition of research contributions
- Reduces form-filling (enter data once, re-use it often)
- Works with many institutions, funders, and publishers
- Is a requirement of many journal manuscript submission systems and grant application forms.

To learn more about ORCID go to: [https://vimeo.com/237730655](https://vimeo.com/237730655)

### 7. DEPARTMENT POLICIES: ACADEMIC PERFORMANCE

#### 7.1 Academic Standards for the Master of Science Program

**Grades:** The student must earn a grade of 2.0 or higher in each course in the approved program of study. The student must repeat any course for which the grade earned was below 2.0.

**Cumulative Grade Point Average:** The student must maintain a cumulative grade–point average of at least 3.00 in the courses in the approved program of study.

**Probational Status:** A student is placed on probational status if the student's cumulative grade–point average for the courses in the approved program of study is below 3.00. A student in probational status is not allowed to enroll in any course the primary focus of which is independent study.

**Retention in and dismissal from the Master’s Program:**

- Should a student's cumulative grade–point average fall below 3.00 after having completed 16 or more credits in courses in the approved program of study, the student may be enrolled in probational status in the master's degree program for one additional semester. If at the end of the additional semester the student's cumulative grade–point average is 3.00 or higher, the student may continue to enroll in the master's degree program. If at the end of the additional semester the student's cumulative grade–point average is still below 3.00, the student will be dismissed from the program.
- Each student’s academic progress and professional potential are evaluated by March 15 of each year. A student who in the judgment of the faculty is making satisfactory academic progress and has professional potential may continue to enroll in the master’s degree program, provided the grade point average is within the acceptable range as previously described. A student who in the judgment
of the faculty is not making satisfactory academic progress or lacks professional potential will be dismissed from the program.

7.2 Academic Standards for the Doctor of Philosophy Program

Grades. The student must earn a grade of 2.0 or higher in each course in the approved guidance committee report, including collateral courses and courses accepted in transfer or used as part of the minimal number of doctoral credits. The student must repeat any course for which the grade earned was below 2.0.

Cumulative Grade Point Average: The student must maintain a cumulative grade–point average of at least 3.00 in the courses in the approved guidance committee.
Probational Status: A student is placed on probational status if the student's cumulative grade–point average for the courses in the approved program of study is below 3.00. A student in probational status is not allowed to enroll in any course the primary focus of which is independent study.

Retention in and dismissal from the Doctoral Program:

- Should a student's cumulative grade–point average fall below 3.00 after having completed half of the courses in the approved guidance committee report, the student may be enrolled in probational status in the doctoral degree program for one additional semester. If at the end of the additional semester the student's cumulative grade–point average is 3.00 or higher, the student may continue to enroll in the doctoral degree program. If at the end of the additional semester the student's cumulative grade–point average is still below 3.00, the student will be dismissed from the program.

- Should a student accumulate more than 3 deferred grades in courses other than those courses the primary focus of which is independent study, the student may be enrolled on probational status in the doctoral program for one additional semester. If at the end of the additional semester the student has no more than 3 deferred grades, the student may continue to enroll in the doctoral degree program. If at the end of the additional semester, the student still has more than 3 deferred grades, the student will be dismissed from the program.

- Each student’s academic progress and professional potential are evaluated by March 15 of each year. A student who in the judgment of the faculty is making satisfactory academic progress and has professional potential may continue to enroll in the doctoral degree program, provided the grade point average and number of courses with deferred grades is within the acceptable range as previously described. A student who in the judgment of the faculty is not making satisfactory academic progress or lacks professional potential will be dismissed from the program.

Note that the grading procedure for the qualifying examinations and the comprehensive examinations, and the policy for repeats of this examination are described in Section 2 of this handbook.

7.3 Student Records

The Department maintains an academic record for students that are kept on file until 5 years after graduation. Graduate students have the right to inspect any of their own educational records, barring
confidential letters of recommendation, including their official transcript. Students also shall have the right to inspect reports and evaluations of his or her academic performance.

A typical inventory of the Department record is as follows.

- College of Engineering Master’s Plans and Doctoral Plans.
- Guidance Committee reports.
- Results of qualifying examinations, comprehensive examinations, and final oral examinations.
- Grade reports from the Office of the Registrar.
- Annual evaluation forms.
- Other forms filed by the student or on behalf of the student.
- Items from the student’s application for admission, including transcripts, test scores, and reference letters.

The Department maintains a separate personnel file for teaching assistants, as prescribed by the GEU/MSU contract. The Department also maintains a separate personnel file for research assistants.

8. DEPARTMENT POLICIES: INTEGRITY AND SAFETY IN RESEARCH AND CREATIVE ACTIVITIES

8.1 The MSU Perspective

Each graduate student shall have the document Guidelines for Integrity in Research and Creative Ideas. See Section 1.5 for access to this document. The conduct of research and creative activities by faculty, staff, and students is central to the mission of Michigan State University and is an institutional priority. Faculty, staff, and students work in a rich and competitive environment for the common purpose of learning, creating new knowledge, and disseminating information and ideas for the benefit of their peers and the general public. The stature and reputation of MSU as a research university are based on the commitment of its faculty, staff, and students to excellence in scholarly and creative activities and to the highest standards of professional integrity.

As a partner in scholarly endeavors, MSU is committed to creating an environment that promotes ethical conduct and integrity in research and creative activities. Innovative ideas and advances in research and creative activities have the potential to generate professional and public recognition and, in some instances, commercial interest and financial gain. In rare cases, such benefits may become motivating factors to violate professional ethics. Pressures to publish, to obtain research grants, or to complete academic requirements may also lead to an erosion of professional integrity.

Breaches in professional ethics range from questionable research practices to misconduct. The primary responsibility for adhering to professional standards lies with the individual scholar. It is, however, also
the responsibility of advisors and of the disciplinary community at large. Passive acceptance of improper practices lowers inhibitions to violate professional ethics.

Integrity in research and creative activities is based not only on sound disciplinary practice but also on a commitment to basic personal values such as fairness, equity, honesty, and respect. These guidelines are intended to promote high professional standards by everyone — faculty, staff, and students alike.

For further information and training, graduate students are encouraged to participate in the Responsible Conduct of Research workshop series, sponsored by the Office of the Vice President for Research and Graduate Studies and by the Graduate Dean. Information on this series is available at the graduate school web site: https://grad.msu.edu/rcr. Responsible conduct of research (RCR) training requirements are described at: https://www.egr.msu.edu/graduate/rcr.

RCR discussion-based training can be completed through available workshops provided in-person and/or online at: https://grad.msu.edu/rcr and through department online discussion based training available through D2L to online student (major code: 8094).

Documenting Responsible Conduct of Research (RCR) training: Students should be logging into the ABILITY information management system at http://ora.msu.edu/train/ to complete their RCR training. This is the system that must be used for proper documentation of training.

8.2 Key Principles

Integrity in research and creative activities embodies a range of practices that includes:

- Honesty in proposing, performing, and reporting research.
- Recognition of prior work.
- Confidentiality in peer review.
- Disclosure of potential conflicts of interest.
- Compliance with institutional and sponsor requirements.
- Protection of human subjects and humane care of animals in the conduct of research.
- Collegiality in scholarly interactions and sharing.
- Adherence to fair and open relationships between senior scholars and their co-workers.

Honesty in proposing, performing, and reporting research: The foundation underlying all research is uncompromising honesty in presenting one’s own ideas in research proposals, in performing one’s research, and in reporting one’s data. Detailed and accurate records of primary data must be kept as unalterable documentation of one’s research and must be available for scrutiny and critique. It is expected that researchers will always be truthful and explicit in disclosing what was done, how it was done, and what results were obtained. To this end, research aims, methods, and outcomes must be described in sufficient detail such that others can judge the quality of what is reported and can reproduce the data. Results from valid observations and tests that run counter to expectations must be reported along with supportive data.
Recognition of prior work: Research proposals, original research, and creative endeavors often build on one’s own work and also on the work of others. Both published and unpublished work must always be properly credited. Reporting the work of others as if it were one’s own is plagiarism. Graduate advisors and members of guidance committees have a unique role in guiding the independent research and creative activities of students. Information learned through private discussions or committee meetings should be respected as proprietary and accorded the same protection granted to information obtained in any peer review process.

Confidentiality in peer review: Critical and impartial review by respected disciplinary peers is the foundation for important decisions in the evaluation of internal and external funding requests, allocation of resources, publication of research results, granting of awards, and in other scholarly decisions. The peer-review process involves the sharing of information for scholarly assessment on behalf of the larger disciplinary community. The integrity of this process depends on confidentiality until the information is released to the public. Therefore, the contents of research proposals, of manuscripts submitted for publication, and of other scholarly documents under review should be considered privileged information not to be shared with others, including students and staff, without explicit permission by the authority requesting the review. Ideas and results learned through the peer-review process should not be made use of prior to their presentation in a public forum or their release through publication.

Disclosure of potential conflicts of interest: There is real or perceived conflict of interest when a researcher has material or personal interest that could compromise the integrity of the scholarship. It is, therefore, imperative that potential conflicts of interest be considered and acted upon appropriately by the researcher. Some federal sponsors require the University to implement formal conflict of interest policies. It is the responsibility of all researchers to be aware of and comply with such requirements.

Compliance with institutional and sponsor requirements: Investigators are granted broad freedoms in making decisions concerning their research. These decisions are, however, still guided, and in some cases limited, by the laws, regulations, and procedures that have been established by the University and sponsors of research to protect the integrity of the research process and the uses of the information developed for the common good. Although the legal agreement underlying the funding of a sponsored project is a matter between the sponsor and the University, the primary responsibility for management of a sponsored project rests with the principal investigator and his or her academic unit.

Protection of human subjects and humane care of animals in the conduct of research: Research techniques should not violate established professional ethics or federal and state requirements pertaining to the health, safety, privacy, and protection of human beings, or to the welfare of animal subjects. Whereas it is the responsibility of faculty to assist students and staff in complying with such requirements, it is the responsibility of all researchers to be aware of and to comply with such requirements.

Collegiality in scholarly interactions and sharing of resources: Collegiality in scholarly interactions, including open communications and sharing of resources, facilitates progress in research and creative activities for the good of the community. At the same time, it has to be understood that scholars who first report important findings are both recognized for their discovery and afforded intellectual property rights that permit discretion in the use and sharing of their discoveries and inventions. Balancing openness and protecting the intellectual property rights of individuals and the institution will always be a challenge for the community. Once the results of research or creative activities have been published or otherwise
communicated to the public, scholars are expected to share materials and information on methodologies with their colleagues according to the tradition of their discipline.

Faculty advisors have a particular responsibility to respect and protect the intellectual property rights of their advisees. A clear understanding must be reached during the course of the project on who will be entitled to continue what part of the overall research program after the advisee leaves for an independent position. Faculty advisors should also strive to protect junior scholars from abuses by others who have gained knowledge of the junior scholar’s results during the mentoring process, for example, as members of guidance committees.

Adherence to fair and open relationships between senior scholars and their coworkers: The relationship between senior scholars and their coworkers should be based on mutual respect, trust, honesty, fairness in the assignment of effort and credit, open communications, and accountability. The principles that will be used to establish authorship and ordering of authors on presentations of results must be communicated early and clearly to all coworkers. These principles should be determined objectively according to the standards of the discipline, with the understanding that such standards may not be the same as those used to assign credit for contributions to intellectual property. It is the responsibility of the faculty to protect the freedom to publish results of research and creative activities. The University has affirmed the right of its scholars for first publication except for “exigencies of national defense”. It is also the responsibility of the faculty to recognize and balance their dual roles as investigators and advisors in interacting with graduate students of their group, especially when a student’s efforts do not contribute directly to the completion of his or her degree requirements.

8.3 Misconduct in research and creative activities

Federal and University policies define misconduct to include fabrication (making up data and recording or reporting them), falsification (manipulating research materials, equipment or processes, or changing or omitting data such that the research is not accurately represented in the record), and plagiarism (appropriation of another person’s ideas, processes, results, or words without giving appropriate credit). Serious or continuing non-compliance with government regulations pertaining to research may constitute misconduct as well. University policy also defines retaliation against whistle blowers as misconduct. Misconduct does not include honest errors or honest differences of opinion in the interpretation or judgment of data.

The University views misconduct to be the most egregious violation of standards of integrity and as grounds for disciplinary action, including the termination of employment of faculty and staff, dismissal of students, and revocation of degrees. It is the responsibility of faculty, staff, and students alike to understand the University’s policy on misconduct in research and creative activities, to report perceived acts of misconduct of which they have direct knowledge to the University Intellectual Integrity Officer, and to protect the rights and privacy of individuals making such reports in good faith.
8.4 Research Involving Human Subjects

The University Committee on Research Involving Human Subjects (UCRIHS) is an Institutional Review Board (IRB). Federal regulations and University policy require that all research projects involving human subjects and materials of human origin be reviewed and approved by an IRB before initiation. Research is defined as “a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge”. The “generalizable knowledge” criteria may include developing publications/papers, theses/dissertations, making public presentations, etc. A human subject of research is a) a living individual from whom an investigator obtains data by interaction or intervention or b) identifiable private information.

All research involving human subjects and/or data collected from living human subjects (including preexisting data) is subject to UCRIHS review. Instructions for applying for approval are available at the following web site: https://hrpp.msu.edu/.

8.5 Research Involving Animals

The use of vertebrate animals in research, teaching, and outreach activities is subject to state and federal laws and guidelines. University policy specifies that: all vertebrate animals under University care (that is, involved in projects under the aegis or sponsorship of the University) will be treated humanely; prior to their inception, all vertebrate animal projects receive approval by the All University Committee on Animal Use and Care (AUCAUC); Michigan State University (MSU) will comply with state and federal regulations regarding vertebrate animal use and care.

Responsibility for assuring compliance with state and federal regulations belongs to the Vice President for Research and Graduate Studies. The Vice President has designated the Assistant Vice President for Research and Graduate Studies to be the "Institutional Official" as defined in federal regulations.

The AUCAUC works closely with the Institutional Official, and has responsibility and authority under federal law for specific actions.

University Laboratory Animal Resources (ULAR), which reports to the Vice President for Research and Graduate Studies, provides a comprehensive program of animal care for all laboratory animal colonies, as well as training for researchers. ULAR also participates in developing institutional policies designed to insure humane treatment of vertebrate animals and to assist investigators in maintaining high quality care of animals used in MSU projects.

An animal use form (AUF) must be submitted to the AUCAUC for review prior to the start of the project, regardless of the source of funding for the project. The AUF can be obtained from the AUCAUC office; the completed form will include descriptions of experimental protocols, plans for animal care, available facilities, and any other matters relevant to the project. Some granting agencies require review and approval of the AUF before a grant application will be processed. An agency-approved grant will not be accepted by the Board of Trustees, nor will an account number be assigned, unless the AUF has been approved by the AUCAUC. For an animal use application form contact: Candy Flynn at 432-4151, email flynnc@msu.edu

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8.6 The Office of Environmental Health and Safety (EHS)

The use of hazardous materials in research, teaching, and outreach activities is subject to state and federal laws and guidelines. The Vice President for Research and Graduate Studies has been assigned responsibility to see that appropriate practices are followed where hazardous materials are involved, to maintain a safe environment for campus personnel, to protect the surrounding community, and to assure that MSU meets its obligations under the law.

Oversight of activities involving hazardous substances is provided by the EHS. EHS is assisted by faculty committees in the areas of radiation safety, chemical safety, and biological safety. The Radiation Safety Committee has responsibility and authority under federal law for specific actions.

It is University policy that faculty members and principal investigators (PIs) are responsible for the day-to-day safety and well-being of all personnel engaged in activities under their aegis. Administrative officers, and EHS, are responsible for making available to faculty information needed to maintain a safe working environment, for providing safety training, for keeping project directors informed about changes in regulations, and for assaying laboratories and work areas for radiation, chemical, or biological hazards.

All individuals who work with hazardous substances must accept shared responsibility for operating in a safe manner once they have been informed (a) about the extent of risk and (b) about safe procedures that should be followed.

The EHS provides live and on-line training classes throughout the year to educate the employees and students of Michigan State University on safe work practices. Completion of these courses by MSU personnel ensures that the university is fulfilling local, state and federal requirements in radiation, chemical, biological, hazardous waste, and environmental safety.

Your training requirements will depend on your specific job duties. Some general guidelines are listed below:

- Required for all laboratory employees engaging in the use of hazardous chemicals (and supervisors of the employees): Chemical Hygiene and Laboratory Safety; Hazardous Waste Refresher (required annually after completion of Chemical Hygiene & Laboratory Safety course) and Security Awareness.
- Required for all employees working with radiation: Radiation Safety Initial; Radiation Safety Refresher (required annually following completion of the Radiation Safety Initial course).
- Required for all employees with a reasonable anticipated risk of exposure to bloodborne pathogens/human blood/bodily fluids: Bloodborne Pathogen Initial; Bloodborne Pathogen Refresher; (required annually following completion of the Bloodborne Pathogen Initial course)

If you would like assistance determining which courses you should complete, please contact the EHS at 355-0153.
9. STUDENT CONDUCT AND CONFLICT RESOLUTION

9.1 Student Conduct

The University expects student conduct and behavior to reflect qualities of good citizenship. The out-of-classroom activities of Michigan State University students should reflect favorably upon the institution and should indicate the personal integrity of the individual. See Spartan Life: Student Handbook and Resource Guide for specific policies, ordinances and regulations that define some of the relevant University expectations.

9.2 Conflict Resolution

Student’s rights and responsibilities, including grievance procedures, are detailed in the document: Academic Freedom for Students at Michigan State University. Procedures more specifically designed for graduate students are to be found in the publication Graduate Student Rights and Responsibilities. In the event of grievances, procedures outlined in these documents shall be followed.

Conflicts involving a graduate student may be handled informally or, at the request of a party or parties, formally. Both parties should attempt to resolve problems in informal, direct discussions. If the problem remains unresolved, then the Chairperson of the Department and/or the Ombudsman should be consulted. If still aggrieved, a student may then submit a formal, written grievance for consideration by a Department hearing board. The hearing board shall be composed of the Department Chairperson or designee and equal numbers of faculty and graduate students selected by their respective groups in accordance with Department Bylaws. If the Department Chairperson is involved in the case, neither the Chairperson nor the designee may serve on the hearing board.

Either party to a grievance may appeal the decision of the Department hearing board to the Engineering College hearing board. All appeals must be in writing.

10. WORK RELATED POLICIES

10.1 Overview

This section provides current and prospective graduate students in electrical engineering with information regarding work related policies, information regarding financial support, and information regarding tuition and fees. Financial support for graduate students takes different forms and might include one or
more of the following: a fellowship, a research assistantship, or a teaching assistantship. Specific awards change with time to reflect changes in tuition, fees, and the general cost of living. The Department of Electrical and Computer Engineering has a number of fellowships and assistantships available for qualified graduate students. Applicants for admission into either the M.S. (with thesis) or Ph.D. programs in electrical engineering are automatically considered for financial support. Admission is linked to the availability of such support.

Sources of financial support include the University itself, the College of Engineering, the Department of Electrical and Computer Engineering, and off-campus organizations in both the public and private sector. Qualifications for receiving specific types of aid vary depending upon the funding source. Some financial aid packages place certain restrictions/responsibilities upon the recipient. For example, a half-time graduate assistantship would require the recipient to perform an average of twenty (20) hours per week of duties in service on the average to the University during the appointment period.

Many financial-support packages require that the student make satisfactory progress toward completing a degree of study. The Department's criteria for satisfactory academic progress includes: course credits completed per semester, the nature of these courses, the grades received, successful completion of required qualifying/comprehensive examinations, and progress in completing M.S. or Ph.D. dissertation research. In addition to satisfactory progress toward completing the degree, continuation of graduate support would depend upon the following: the recipient has performed the assigned duties satisfactorily; past level of support and total number of semesters of support; the availability of funds to continue the current level of financial assistance; the needs of the Department for the particular services for which the recipient is qualified to perform. When resources for financial aid are limited and the demand of aid exceeds the amount of funds available, continuation of financial aid for an individual will depend upon merit relative to others requesting aid and the needs of the Department to fulfill its overall mission of teaching, research and outreach.

10.2 Teaching Assistantship Selection Criteria

Essentially all TA positions in ECE are reserved for new, incoming students. However, from time to time there is an unexpected vacancy in one course (usually for one semester only). To fill such a position the graduate secretary keeps a list of students who may be interested in a TA position. This list is kept at the ECE Department Office (2120 EB) and is recreated every semester. If there is an opening it will happen very close to the beginning of the semester, leaving no time to post specific advertisements.

Please contact the graduate secretary if you wish to be added to the list. Preference is given to Ph.D. students with experience in the course that has an opening. Academic performance and specific experience in the topic at hand are used if more than one student is available.

In considering the assignment of ECE Teaching Assistantships, the Graduate Admissions, Recruitment and Financial Aid Committee has adopted a set of criteria as a guideline for selecting applicants for TA positions. These are intended to support the Department's teaching mission and research mission. The ranked criteria for TA appointment decisions are:

- Those students to whom the Department has a prior commitment to provide support, such as students who have received recruitment offers upon admission or who have received a multi-year support offer.
• Ph.D. students actively involved in research and do not have a research assistantship, fellowship, or like support. This would be considered an unusual and time limited situation because the normal expectation is that a doctoral student would have a research assistantship or other non-TA support. Appointments would usually be limited to no more than a year unless there were extenuating circumstances.
• M.S. students doing a thesis who do not have a research assistantship, fellowship, or like support. Appointments would usually be limited to no more than a year unless there were extenuating circumstances.

Academic performance and qualifications to teach a particular course will also be considered in TA appointment decisions.

MSU candidates for TA appointments who were required to demonstrate English proficiency as a condition for regular admission to Michigan State University must also demonstrate that they meet a minimum standard of proficiency in spoken English before they can be assigned teaching work that involves oral communication with undergraduate students.

Those international teaching assistants (ITAs) may meet this requirement in one of the following ways:
• Presenting a TOEFL iBT speaking section score of 27 or higher.
• Receiving a score of 50 or higher on the MSU Speaking Test.
• Taking AAE 451 or AAE 452 (ITA language support courses) and receiving a score of 50 or higher on the ITA Oral Interaction Test (ITAIO).

Those ITAs who received a waiver of the TOEFL or of other accepted tests of English proficiency for admission, must also meet the requirement of proficiency in spoken English before they are assigned to teaching work that involves oral communication with undergraduate students. To meet this requirement, those ITAs may use any of the three options listed above. Individual exceptions from these requirements (on a case-by-case basis in rare circumstances) will be considered by the Graduate School in consultation with the ELC upon the request of the department and with the endorsement of the Associate Dean of the College.

10.3 Research Assistantship Selection Criteria

Research assistants are generally selected from among the graduate student body and from among qualified applicants by individual faculty members. Research assistants are often selected to work on a specific research project or projects for which the faculty member has funding. Often, but not necessarily always, the work is related to the thesis work of the student. Renewal of research assistantships is based on satisfactory performance and availability of funds.

10.4 The Graduate Employees Union (GEU)

Teaching Assistants should be aware of their rights and responsibilities under the current version of the contract between MSU and the GEU. The Department will provide you with a copy of this agreement if
you are appointed as a TA. You may also obtain the agreement, and other information about the GEU, at the web site https://www.hr.msu.edu/contracts/.

10.5 University Graduate Assistantship Policies

Graduate Assistants (including research assistants and teaching assistants) are available only to graduate students who are making satisfactory progress toward their degrees, including maintaining at least a 3.00 grade point average. Graduate assistants are appointed on a quarter-time, half-time, or three-quarter time basis. The academic year encompasses two appointment periods – August 16 – December 31 and January 1 – May 15. Summer appointments cover the period from May 16 – August 15. During each appointment period a graduate assistant’s duties to the University require an average of:

- 10 hours per week for a quarter-time stipend.
- 20 hours per week for a half-time stipend.
- 30 hours per week for a three-quarter time stipend.

The student is expected to be available during the appointment period. Any absences, including for attendance of professional meetings, must be arranged with the supervising faculty member and the Department.

Graduate assistants must be registered each semester in which they hold assistantships. For quarter-time appointments, the minimum enrollment is 6 credits for master’s degree students and 3 credits for doctoral students prior to completion of the comprehensive examination (including credits in 899 and 999) and the maximum enrollment is 16 credits (excluding credits in 899 or 999). For half-time appointments, the minimum enrollment is 6 credits for master’s degree students and 3 credits for doctoral students prior to completion of the comprehensive examination (including credits in 899 and 999) and the maximum enrollment is 12 credits (excluding credits in 899 or 999). For three-quarter time appointments, the minimum enrollment is 6 credits for master’s degree students and 3 credits for doctoral students prior to completion of the comprehensive examination (including credits in 899 and 999) and the maximum enrollment is 12 credits (excluding credits in 899 or 999). The minimum enrollment for doctoral students who have successfully completed all comprehensive examinations is 1 credit for all graduate assistantship levels.

International students should also be aware of minimum credit enrollments to satisfy visa requirements. The MSU Office of International Students and Scholars is an important resource of information in this regard.

10.6 Graduate Assistants Covered by the GEU

For GEU covered assistantships, please see the current MSU/GEU agreement for information regarding stipends, tuition and fee benefits, and health insurance coverage.
10.7 Graduate Assistants not Covered by the GEU

The information listed below is subject to yearly change. Please consult The Graduate School home page for the latest information at: http://www.grad.msu.edu.

Stipends: Information regarding current graduate assistantships and stipends can be found at: https://grad.msu.edu/assistantships.

Tuition and fee benefits: Even though the graduate student does not enroll for 10 credits or more, benefits include the following:

1. Tuition waiver in the amount of 9 credits for Fall semester, 9 credits for Spring semester, and four credits for summer session. The tuition waiver will be provided during the period of the assistantship, to a maximum of 22 credits per year.
2. Exemption from out-of-state resident tuition. This exemption applies to a summer session that precedes or follows an appointment for an entire academic year, regardless of whether the student was previously enrolled at MSU. If the student does not have a signed graduate assistantship form before registering for summer session, he or she will pay out-of-state resident course fees and tuition. Upon receiving a copy of the appointment form for the entire academic year through the middle of the semester of the subsequent fall semester, the Office of the Registrar will refund the full amount of out-of-state tuition that the student paid for the summer session.
3. Matriculation and infrastructure/technology support fees are waived.

Health Insurance: Graduate assistants (domestic and international) are automatically enrolled in a health insurance plan, the premium of which is paid by the University. The plan provides the following coverage:

- Fall appointment only: coverage from August 15 to February 14 of the following year.
- Fall and spring appointments—coverage from August 15 to August 14 of the following year.
- Spring appointment only—coverage from January 1 to August 14.
- Summer appointment only—coverage from May 15 to August 14. Enrolled students may also insure their eligible spouse and/or dependent children (residing with the insured).

For questions concerning waiver processing or general information, contact the MSU Benefits office at (517) 353-4434 (Nisbet Building), East Lansing, MI 48823 and on the web: http://www.hr.msu.edu/index.asp.

10.8 Externally Funded Fellowships and In-State Tuition Status.

Receipt of externally funded fellowships by students who have written their own grant applications and worth at least $20,000 (direct costs) now makes the students eligible for in-state tuition rate. The in-state tuition rate applies only to the semesters during which the student is supported by the fellowship. This policy applies only to grants funded through a competitive process by a US institution/agency/foundation. Funds obtained through non-competitive processes (e.g., need-based fellowships) or from international
sources do not qualify the students for in-state tuition rates. For more information contact Melissa Del Rio (mdelrio@grd.msu.edu).

10.9 Use of Department Facilities and Supplies

Graduate students in the electrical engineering programs are provided with a campus mailbox in the Engineering Building. They have access to computer systems under the supervision of the Division of Engineering Computing Services (DECS), and server storage and email accounts, also via DECS. Most graduate students find it well worth their while to purchase their own personal computer, to supplement the services provided by DECS. Graduate assistants are provided with office space and telephone access for local and campus calls. Copy machines are available in the Engineering Library with a customary charge per page. Teaching assistants may have material copied that is required for their teaching duties by the office copying machine without charge, up to a per-semester allotment.

10.10 Fees and Rates

For current information regarding fees and rates associated with enrolling in the Graduate Programs in Electrical Engineering, please see the “Online Calculator” for Tuition, Fees, and Housing Calculator at the web site http://www.ctlr.msu.edu/COSTudentAccounts/TuitionCalculator.aspx.

Note that a half-time teaching assistantship or research assistantship includes coverage of tuition for 9 credits as well as a monthly stipend.

10.11 Outside work for pay

Outside work for pay must be within guidelines established by the University and College. The University guidelines for outside work for pay for graduate assistants are that the student must continue to make adequate progress toward the degree. If the Department judges that the student is not making adequate progress that is a basis for terminating the assistantship after a reasonable warning period.

11. UNIVERSITY RESOURCES

11.1 The University

Michigan State University has been advancing knowledge and transforming lives through innovative teaching, research, and outreach for 150 years. It is known worldwide as a major public university with global reach and extraordinary impact. It’s a 14 degree-granting college and affiliated private law school offer 200 programs of study. They attract scholars worldwide who are interested in combining education with practical problem solving.
Students from all 83 counties in Michigan, all 50 states in the United States, and about 125 other countries are represented in the student body of 46,045 students (Fall Semester, 2007). There are approximately 4,500 faculty and academic staff, and approximately 6,000 support staff employees. Library resources include a research collection of approximately 4.8 million volumes housed in the main library and nine branch libraries across campus. More than 500 registered student organizations include honoraries; professional organizations and professional fraternities and sororities; recreational and athletic groups; and international, racial/ethnic, religious, academic interest area, political, social service, volunteer, and media organizations.

In Fall Semester, 2007, there were 8,596 students in graduate and professional programs of study. The Graduate School at MSU provides programs that serve all graduate students, including a variety of free workshops throughout the year. The Council of Graduate Students represents all registered MSU graduate and graduate-professional students. The Graduate Employee’s Union represents Teaching Assistants.

11.2 The College

Michigan State University’s Engineering College offers graduate programs through 6 academic Departments: Agricultural Engineering, Chemical Engineering and Materials Science, Civil and Environmental Engineering, Computer Science and Engineering, Electrical and Computer Engineering, and Mechanical Engineering. The college houses many research centers and laboratories, which vigorously promote the interdisciplinary collaboration of its faculty members with each other, and with other university Departments, other universities, and the general public.

A $34.5 million addition and renovation in 1989 provided 167,000 square feet of space for laboratories, classrooms, offices, and the engineering library. The Engineering Building, constructed in 1962, underwent a $14-million, 46,000 square-foot addition in 1997, accommodating the Herbert H. and Grace A. Dow Institute for Materials Research, one of the premier facilities in the world for the study of composite materials. Other facilities include the Engineering Facility at the MSU Research Complex; the Jolly Road Research Facility; and the Automotive Research Experiment Station located in the Hulett Road Research Facility.

11.3 The Department

The electrical engineering graduate program has approximately 250 students, of which about half are doctoral students and half master’s students. The graduate students work in close relationship with the approximately 40 faculty in the Electrical and Computer Engineering Department in a strong and growing research program. Typically, over 30 graduate courses are offered in an academic year, with an average class size of 15 students. We invite you to visit the Department’s home web page at http://www.egr.msu.edu/ece/ to learn more about the Department, including the current events.

11.4 The Campus
Campus cultural and other special centers include the Wharton Center for Performing Arts, Kresge Art Museum, MSU Museum, Kellogg Center, Abrams Planetarium, WKAR-AM/FM public radio, and WKAR public television. Sports devotees can follow the performance of any of the 25 men's and women's intercollegiate teams on campus. Those wishing to participate in athletics can take advantage of any of the many facilities available. These include gymnasiums for basketball and racquet sports, an indoor ice-skating rink, five swimming pools, a number of outdoor tennis courts, and two 18-hole golf courses. The intramural sports program is one of the largest in the nation.

The campus has been called "an academic park" and the beautiful gardens and landscaping are testimony to many generations of careful stewardship. The 5,200 acres, located three miles east of Michigan’s Capitol in Lansing, represent a unique blend of the traditional and the innovative and is adjacent to its college town, East Lansing. The Red Cedar River traverses the campus and offers opportunities for lively activities such as canoe races or quiet reflection for those who wish to walk or study along it’s tree-lined shores.

### 11.5 The Lansing Community

The greater Lansing area, with a population of approximately a half-million, boasts a fine symphony orchestra which performs at the Wharton Center; several dance and theater groups, art galleries; the state capitol building, museums, state and local libraries; an arboretum, a zoo, a variety of parks, and a number of restaurants to suit most pocketbooks and tastes.

Graduate students in need of a change of scene can take the train to Chicago from East Lansing or drive an hour or two to Ann Arbor, Grand Rapids, or Detroit. In addition, day or weekend jaunts can be made to such attractions as Greenfield Village and the Henry Ford Museum, the Irish Hills, the Kellogg Biological Station, numerous National and State Forests in both the lower and upper peninsulas, Lake Michigan and Lake Huron beaches and parks, and Mackinac Island. Recreational activities in Michigan are highlighted by water sports in the summer months and skiing in winter.

### Appendix 1 – Department Areas of Specialization and Sample Programs.

This portion of the handbook is intended to provide assistance in planning both the research and course portions of your graduate study experience. Graduate study in our Department is organized into seven broad areas as shown below (also see: [https://ece.msu.edu/academics/focus-areas](https://ece.msu.edu/academics/focus-areas)).

- Computing
- Electromagnetics
- Energy and Power Systems
- Materials and Devices
- Microelectronics
- Robotics and Control
- Signal Processing and Communications

Examples of research opportunities in the Electrical and Computer Engineering Department related to the above areas can be found at [https://ece.msu.edu/research-groups](https://ece.msu.edu/research-groups) and courses associated with the various research areas are found in the individual descriptions for each research group. These provide guidance regarding choice of a thesis topic. You are encouraged to contact faculty within the area to obtain more
information about specific research projects as well as additional research opportunities that may not be listed in these pages.

Regarding course selection, graduate plans of study are individualized, depending on your interests. Each graduate student should establish a plan early in the program of study – at least by the end of the first semester of study for Master’s students and by the end of the first year of study for Doctoral students.

The following Master Degree Sample Programs are Plan A (Thesis Option), that have been organized to be completed in 4 semesters, including summer, starting in a Fall Semester of the Academic year. You may use these example plans to help you in designing your own course plan, modifying them as is appropriate to your interests. The sample plans ensure that all core requirements are met, as well as other University, College, and Department minimum requirements as described in detail elsewhere in this handbook. As you plan your course of study, please consult with your academic advisor to design your specific program that will also meet those degree requirements.

A doctoral program plan of study depends strongly on the dissertation topic, and is prescribed for the candidate by the student’s doctoral guidance committee. Thus, the establishment of your doctoral guidance committee should precede the selection of a doctoral course plan.

Appendix 1.1: Computing Sample Program

Area Introduction
Computer architecture is a bridge area that ties the implementation hardware (devices, circuits, VLSI) with the system (compilers, operating systems) and application software and networks, and as such lies at the heart of Computer Engineering. Researchers in this area work not only in core computer architecture, but also investigate crosscutting architectural issues arising from interactions with the underlying hardware, software, and network. Research contributions may be in the form of new theories, novel design methods backed by simulation, or related to the creation of computational artifacts (modeling, simulation tools, software environments, etc.). Students specializing in Computer Architecture at Michigan State University will acquire the broad background necessary to contribute effectively to the design and implementation of computer architectures that meet application functional requirements as well as cost, power, performance, and reliability goals.

The introduction of wireless networks and its handling of user mobility is perhaps one of the most significant developments of recent years in the rapidly converging areas of pervasive computing and telecommunications. With the introduction of 5G mobile systems, self-organizing sensor and ad hoc networks and the ubiquitous nature of IP connectivity, the technology of mobile networking is likely to be a major growth area in the coming years.

Graduate program coursework at the M.S. and Ph.D. levels is taken in both the Electrical and Computer Engineering (ECE) and Computer Science and Engineering (CSE) Departments. Courses focus on advanced computer architecture, digital electronic circuit and VLSI design, contemporary computer-aided design tools and methodologies, design of systems using embedded processors, design of system-on-a-chip, fault-tolerance, design, test and packaging of application-specific integrated circuits, hardware/software co-design, algorithms, compilers, operating systems, networks, parallel computing,
and other specialized courses. Independent study courses may be taken in either Department with a student and faculty member working one-on-one to explore in depth a subject of mutual interest.

**Research Areas:**
Please visit: [link] for further details of current research in the Computing group, and the faculty involved.
M.S. Degree in Electrical and Computer Engineering  
with Emphasis on Computing

Sample Program of Study

Fall Semester (FS)                          Credits
1. ECE 830: Embedded Cyber-Physical Systems   (3)
2. CSE 830: Design and Theory of Algorithms    (3)
3. MTH 880: Combinatorics I                  (3)

Spring Semester (SS)
1. CSE 812: Distributed Systems               (3)
2. ECE 960C: Networked and Embedded Control Systems (3)
3. STT 861: Theory of Probability and Statistics I (3)

Summer Semester (US)
1. ECE 899: Master’s Thesis Research          (3)

Fall Semester (FS)
1. ECE 863: Analysis of Stochastic Systems    (3)
2. ECE 848: Evolutionary Computation           (3)
3. ECE 899: Master’s Thesis Research           (3)

Total credits:                               (30)

Partial List of Alternative Courses:

ECE 410 (4) FS, SS  ECE 816 (3) SS  ECE 921 (3) SS
ECE 411 (4) FS, SS  CSE 410 (3) FS, SS  MTH 850 (3) FS
ECE 466 (3) FS      CSE 420 (3) FS, SS  MTH 851 (3) SS
ECE 477 (3) FS      CSE 422 (3) FS, SS  MTH 810 (3) SS
ECE 835 (3) FS      CSE 824 (3) FS      STT 441 (3) FS, SS
ECE 859 (3) SS      CSE 860 (3) SS      STT 461 (3) SS
Appendix 1.2: Electromagnetics & Plasmas

Area Introduction
Maxwell's equations succinctly embody the laws of electrodynamics and constitute the fundamental physics beneath electrical, beam and plasma, electronic, communication, computer, optical, biological, and geophysical technologies. While simple and elegant in form these equations pose numerous challenges when applied to the analysis of practical problems. Over the past century, applied electromagnetics has played a key role in the development of various technologies; and it continues to play a significant role in all the aforementioned areas. Graduate students plan their M.S. and Ph. D program by choosing from a range of comprehensive course offerings. Fundamental concepts are treated in the Master’s level course while more specialized set of courses supplement the research program. Laboratories are available to support the research program. The facilities available, and more importantly, research being pursued are intended to train students into being independent thinkers, and perform cutting edge interdisciplinary research in either a University, or Government, or Industrial setting.

Research Areas:
Please visit: https://ece.msu.edu/research-groups/electromagnetics for further details of current research in the Electromagnetics group, and the faculty involved.
# M.S. Degree in Electrical and Computer Engineering
with Emphasis on Electromagnetics

Sample Program of Study

<table>
<thead>
<tr>
<th>Fall Semester (FS)</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ECE 835: Electromagnetic Fields and Waves I</td>
<td>(3)</td>
</tr>
<tr>
<td>2. ECE 874: Physical Electronics</td>
<td>(3)</td>
</tr>
<tr>
<td>3. PHY 810: Methods of Theoretical Physics</td>
<td>(3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Semester (SS)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. ECE 407: Electromagnetic Compatibility</td>
<td>(3)</td>
</tr>
<tr>
<td>2. ECE 836: Electromagnetic Fields and Waves II</td>
<td>(3)</td>
</tr>
<tr>
<td>3. ECE 850: Fundamentals of Plasmas</td>
<td>(3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Summer Semester (US)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. ECE 899: Master’s Thesis Research</td>
<td>(3)</td>
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<table>
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<tr>
<th>Fall Semester (FS)</th>
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<tbody>
<tr>
<td>1. ECE 929D: Fast Computational Methods in Electromagnetics and Acoustics</td>
<td>(3)</td>
</tr>
<tr>
<td>2. MTH 451: Numerical Analysis I</td>
<td>(3)</td>
</tr>
<tr>
<td>3. ECE 899: Master’s Thesis Research</td>
<td>(3)</td>
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</table>

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Total credits: (30)

### Partial List of Alternative Courses:

- ECE404 (4) FS
- ECE405 (4) FS
- ECE810 (3) FS
- ECE832 (3) FS
- ECE837 (3) SS
- ECE850 (3) SS
- ECE 864 (4) SS
- ECE929 B (3) SS
- ECE989 (3) FS
- MTH 841 (3) FS
- MTH 842 (3) SS
- MTH 850 (3) FS
- MTH 851 (3) SS
- PHY 841 (3) SS
- PHY 842 (3) FS
- PHY 851 (3) FS
- PHY 852 (3) SS
Appendix 1.3: Energy and Power Systems

Area Introduction:
Technological advancements in power systems, electrical machines and power electronics are vital for the rapidly evolving technologies that save lives, preserve the environment, increase safety and provide entertainment. Courses and transformative research in the energy and power systems area introduce engineers to the advanced concepts enabling development of cutting-edge technologies.

Energy systems have undergone tremendous evolution since the turn of the century, with the introduction of competitive markets and grid modernization initiatives such as deployment of enhanced instrumentation, communication, control and data processing technologies, and steady increase in renewable generation and storage accompanied by reduction in the use of fossil fuels. This has driven innovation in system operating paradigms, electrification of transportation, and advances in power electronic devices, systems and drives. Research in power systems includes innovation in operating paradigms that integrate these technologies and ensure reliable, stable and secure delivery of energy across all sectors.

“Electrification of everything” increases the demand for compact, reliable, efficient electrical machines and drives. Adoption of new materials and new manufacturing technologies promote development of novel electrical machine designs to meet needs. A key to improving the performance and efficiency of electrical machines and drives is development of controllers acknowledging the non-ideal behaviors of the machine characteristic parameters. The ubiquitous nature of electrical machines and drives requires fault-tolerant designs as well as development of online failure diagnosis, prognosis and mitigation algorithms.

The research in power electronics enables numerous emerging applications ranging from energy production, transmission, utilization, to transportation and industrial processes. The increasingly more demanding specifications keep pushing the envelope of efficiency, power density and dynamic performance even in very harsh environment. The integrated understanding of devices, topologies, system modeling, design, and numerical simulation and prototype validation makes power electronics a fascinating field to work in.

The Energy Reliability and Security (ERiSe) laboratory offers a rich range of research opportunities in modeling, simulation, analysis, planning and operation of modern energy systems and is internationally reputed. The shared power electronics, electrical machines and drives research laboratory, one of the finest in the country, facilitate organic collaboration and sharing of ideas among the faculty members and students. The laboratory is fully equipped for design, assembly and testing prototypes ranging from a few Watts to 500 kW under varying operating conditions.

Research Areas:
Please visit: https://ece.msu.edu/research-groups/energy-power for further details of current research in the Energy and Power Systems group, and the faculty involved.
### M.S. Degree in Electrical and Computer Engineering with Emphasis on Energy and Power Systems

Sample Program of Study

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td><strong>Fall Semester (FS)</strong></td>
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<td></td>
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<tr>
<td>1.</td>
<td>ECE 821: Advanced Power Electronics and Applications</td>
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</tr>
<tr>
<td>2.</td>
<td>ECE 851: Linear Systems and Control</td>
<td>(3)</td>
</tr>
<tr>
<td>3.</td>
<td>ECE 817: Advanced Electrical Drives</td>
<td>(3)</td>
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<tr>
<td><strong>Spring Semester (SS)</strong></td>
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<td></td>
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<tr>
<td>1.</td>
<td>ECE 822: Power System Analysis</td>
<td>(3)</td>
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<tr>
<td>2.</td>
<td>MTH 421: Analysis II</td>
<td>(3)</td>
</tr>
<tr>
<td>3.</td>
<td>ECE 925: Advanced Topics in Power</td>
<td>(3)</td>
</tr>
<tr>
<td><strong>Summer Semester (US)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>ECE 899: Master’s Thesis Research</td>
<td>(3)</td>
</tr>
<tr>
<td><strong>Fall Semester (FS)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>ECE 863: Analysis of Stochastic Systems</td>
<td>(3)</td>
</tr>
<tr>
<td>2.</td>
<td>STT 861: Theory of Probability and Statistics I</td>
<td>(3)</td>
</tr>
<tr>
<td>3.</td>
<td>ECE 899: Master’s Thesis Research</td>
<td>(3)</td>
</tr>
</tbody>
</table>

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**Total credits:** (30)

#### Partial List of Alternative Courses:

- ECE 420 (1) FS ECE 825 (3) SS
- ECE 835 (3) FS ECE 823 (3) FS
- ECE 827 (3) SS ECE 824 (3) FS
Appendix 1.4: Materials and Devices

Area Introduction:
Much of the infrastructure that has facilitated the remarkable advances in electronic and computer technology has been based on advances in electronic materials and devices. Research at Michigan State University in electronic materials and devices includes simulation, design, fabrication, characterization and applications. Fabrication involves materials synthesis by a variety of methods. It also includes microlithography and a variety of etching methods in a cleanroom environment designed to facilitate exploration of new materials and device structures, including microelectromechanical systems (MEMS), integrated microsystems and nanoscale devices. A variety of characterization equipment is available in modern, well equipped laboratories. Graduate students plan their M.S. or Ph.D. programs by selecting from comprehensive graduate course listings. Fundamental electrosience concepts are treated in Master’s level courses while advanced research development courses support the various research specializations.

Research Areas:
Please visit: https://ece.msu.edu/research-groups/materials-devices for further details of current research in the Materials and Devices group, and the faculty involved.
M.S. Degree in Electrical and Computer Engineering
with Emphasis on Materials and Devices

Sample Program of Study

Fall Semester (FS)  Credits
1. ECE 874: Physical Electronics (3)
2. ECE 835: Advanced Electromagnetic Fields and Waves I (3)

Spring Semester (SS)  Credits
1. ECE 875: Electronic Devices (3)
2. ECE 871: Micro-electro-mechanical Systems Fabrication (3)
3. STT 861: Theory of Probability and Statistics I (3)

Summer Semester (US)  Credits
1. ECE 899: Master’s Thesis Research (3)

Fall Semester (FS)  Credits
1. ECE 877: Cleanroom Procedures (3)
2. PHY 471: Quantum Physics I (3)
3. ECE 899: Master’s Thesis Research (3)

Total credits: (30)

Partial List of Alternative Courses:

- ECE 410 (4) FS, SS  PHY 851 (3) FS  MTH 451 (3) FS
- ECE 411 (4) FS, SS  PHY 852 (3) SS  MTH 850 (3) FS
- ECE 836 (3) SS  NSC 820 (3) FS, SS  MTH 852 (3) SS
- ECE 850 (3) SS  STT 441 (3) FS, SS, US
- ECE 931C (3) FS  STT 461 (3) SS
Appendix 1.5: Microelectronics

Area Introduction:
As we enter a new century we are witnessing a period of radical development in very large scale integrated systems (VLSI), the proliferation of embedded computers and entire systems being built on a single chip. This has come about because of the remarkable advances in integrated circuit processing technology that have seen dramatic increases in chip complexities, while the manufacturing cost of a chip has remained fairly constant. It has been predicted that this trend will continue unabated with more than a billion gates per chip. But what can we do with this technology? How can we best use it? Students specializing in VLSI and microelectronics circuit at Michigan State University are developing the theoretical foundation and practical hands-on experience necessary to answer these questions.

Graduate program coursework at the M.S. and Ph.D. levels is taken in both the Electrical and Computer Engineering (ECE) and Computer Science (CSE) Departments. Courses focus on advanced digital electronic circuit design, mixed-signal and analog circuits, contemporary computer-aided design tools and methodologies, design of systems using embedded processors, design of system-on-a-chip, fault-tolerant and packaging design issues, the design, test and packaging of application-specific integrated circuits (ASICs), hardware/software co-design and artificial intelligence. Independent study courses may be taken in either Department with a student and faculty member working one-on-one to explore in depth a subject of mutual interest.

Research Areas:
Please visit: https://ece.msu.edu/research-groups/micro-nano-electronics for further details of current research in the Microelectronics group, and the faculty involved.
M.S. Degree in Electrical and Computer Engineering with Emphasis on Microelectronics

Sample Program of Study

<table>
<thead>
<tr>
<th>Semester</th>
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<th>Course Title</th>
<th>Credits</th>
</tr>
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<td>Fall Semester (FS)</td>
<td>ECE 851</td>
<td>Linear Systems and Control</td>
<td>(3)</td>
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<tr>
<td></td>
<td>ECE 874</td>
<td>Physical Electronics</td>
<td>(3)</td>
</tr>
<tr>
<td></td>
<td>MTH 451</td>
<td>Numerical Analysis I</td>
<td>(3)</td>
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<table>
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<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
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<tr>
<td>Spring Semester (SS)</td>
<td>ECE 832</td>
<td>Analog Integrated Circuit Design</td>
<td>(3)</td>
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<tr>
<td></td>
<td>ECE 819</td>
<td>Smart Material Sensors and Actuators</td>
<td>(3)</td>
</tr>
<tr>
<td></td>
<td>ECE 875</td>
<td>Electronic Devices</td>
<td>(3)</td>
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</table>

<table>
<thead>
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<th>Semester</th>
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<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer Semester (US)</td>
<td>ECE 899</td>
<td>Master’s Thesis Research</td>
<td>(3)</td>
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</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester (FS)</td>
<td>STT 861</td>
<td>Theory of Probability and Statistics I</td>
<td>(3)</td>
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<tr>
<td></td>
<td>ECE 932</td>
<td>Advanced Topics in Analog Circuits</td>
<td>(3)</td>
</tr>
<tr>
<td></td>
<td>ECE 899</td>
<td>Master’s Thesis Research</td>
<td>(3)</td>
</tr>
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</table>

Total credits: (30)

Partial List of Alternative Courses:

- ECE 410 (4) FS, SS
- ECE 411 (4) FS, SS
- ECE 466 (3) FS
- ECE 477 (3) FS
- ECE 835 (3) FS
- ECE 859 (3) SS

- ECE 859 (3) SS
- CSE 420 (3) FS, SS
- CSE 410 (3) FS, SS
- MTH 850 (3) FS
- MTH 851 (3) SS
Appendix 1.6: Robotics and Control

**Area Introduction:**
Robotics and control are two closely related fields, both of which have a rich heritage of intellectual depth and practical achievements. The Robotics and Control area group offers an array of undergraduate and graduate courses in control, robotics, and automation, and conducts vibrant research at the frontier of these fields. For example, in robotics research, faculty research interests span underwater robotics, aerial robotics, autonomous vehicles, and soft robotics; and in controls, faculty research interests include distributed and networked control, learning-based control, game theory, and cyber-physical-human systems. These research activities are often motivated by and evaluated in real-world applications, such as tracking invasive species, autonomous driving, resilience in cyber-physical systems, and underwater search and rescue.

**Research Areas:**
Please visit: [https://ece.msu.edu/research-groups/robotics-control](https://ece.msu.edu/research-groups/robotics-control) for further details of current research in the Robotics and Control group, and the faculty involved.
M.S. Degree in Electrical and Computer Engineering
with Emphasis on Robotics and Control

Sample Program of Study

Fall Semester (FS)  
1. ECE 851: Linear Systems and Control (3)  
2. ECE 863: Analysis of Stochastic Systems (3)  
3. MTH 451: Applied Linear Algebra (3)  

Spring Semester (SS)  
1. ECE 818: Robotics (3)  
2. ECE 853: Optimal Control (3)  
3. ECE 859: Nonlinear Systems and Control (3)  

Summer Semester (US)  
1. ECE 899: Master’s Thesis Research (3)  

Fall Semester (FS)  
1. MTH 421: Analysis II (3)  
2. ECE 854: Robust Control (3)  
3. ECE 899: Master’s Thesis Research (3)  

------------------  
Total credits: (30)  

Partial List of Alternative Courses:

ECE 819 (3) FS  
ECE 825 (3) SS  
ECE 856 (3) FS  
ECE 864 (3) SS  
ECE 885 (3) SS  
MTH 451 (3) FS  
STT 441 (3) FS, SS, US
Appendix 1.7: Signal Processing and Communications

Area Introduction:
The signal processing and communications area includes topic related to the electrical, magnetic, and computer processing of information-bearing signals. SP&C courses and research involve techniques for modeling systems that generate and process information, and for modeling channels over which information is transmitted. Emphasis is placed on the mathematical understanding of systems, signals, and processing techniques and their practical applications.

The SP&C area has undergone explosive growth in recent decades. New computing technologies have revolutionized both long and short distance communication systems as well as the systems for performing local computations such as filtering, coding, and pattern recognition. Modern high-capacity communication channels reliably carry text, data, voice, video, and other information messages over satellite links, optical fiber networks, wireless channels, and broadband network services into the office and private homes. SP&C applications are found in every spectral range, from low frequency biological or geophysical signals, to audio and video bands, and on up to the microwave and optical bands.

Interest in information processing technology represented by the SP&C area continues to grow dramatically, and engineers with graduate degrees in this area are in high demand by analog and digital communication industries, high technology research and development companies, government laboratories, universities, and many other companies with information and data handling needs.

Research Areas:
Please visit: https://ece.msu.edu/research-groups/signal-processing for further details of current research in the Signal Processing and Communications group, and the faculty involved.
M.S. Degree in Electrical and Computer Engineering
with Emphasis on Signal Processing and Communications

Sample Program of Study

<table>
<thead>
<tr>
<th>Fall Semester (FS)</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>1. ECE 863: Analysis of Stochastic Systems</td>
<td>(3)</td>
</tr>
<tr>
<td>2. ECE 851: Linear Systems and Control</td>
<td>(3)</td>
</tr>
<tr>
<td>3. MTH 421: Analysis II</td>
<td>(3)</td>
</tr>
</tbody>
</table>

| Spring Semester (SS)                           |         |
| 1. ECE 864: Detection and Estimation Theory    |         |
| 2. ECE 466: Digital Signal Processing and Filter Design | (3) |
| 3. ECE 963: Advanced Topics in Systems         | (3)     |

| Summer Semester (US)                           |         |
| 1. ECE 899: Master’s Thesis Research           | (3)     |

| Fall Semester (FS)                              |         |
| 1. ECE 865: Analog and Digital Communications   | (3)     |
| 2. ECE 867: Information Theory and Coding       | (3)     |
| 3. ECE 899: Master’s Thesis Research            | (3)     |

---

Total credits: (30)

Partial List of Alternative Courses:

- ECE 457 (3) SS
- ECE 458 (1) SS
- ECE 853 (3) SS
- STT 441 (3) FS, SS, US
- STT 844 (3) SS
- STT 861 (3) FS
- STT 862 (3) SS
- CSE 471 (3) SS
- CSE 835 (3) SS
- CSE 802 (3) SS
- CSE 803 (3) FS
- CSE 822 (3) FS
- MTH 415 (3) FS, SS, US
- MTH 425 (3) FS, SS
- MTH 461 (3) FS
- MTH 810 (3) SS
Appendix 2 – Designing Your M.S. Program in Electrical and Computer Engineering

This appendix is intended to provide assistance in designing your M.S. Program in Electrical and Computer Engineering. The program is to be filed before 6 credits are finished.

1. Use the work sheet supplied in this Appendix in preparation to meeting with your advisor.
2. After you and your advisor agree on a program of courses, use the web based SIS system (https://student.msu.edu/splash.html) to submit the program.
3. The graduate secretary will review the program with regard to meeting criteria such as satisfying the minimum number of credits, minimum number of core classes, and so forth. After approval by the graduate secretary, it will be sent to your advisor and subsequently to other signatory members for their approval.

Included with this appendix is an example of a Master’s Degree Program Plan. The plan constitutes a written agreement. It can be changed, after which it will be routed through the same approval process. Once a grade has been received for a course on your Program Plan, that course may not be removed from your Program Plan.
Appendix 2.1: Worksheet: Planning Your ECE M.S. Program

1. The six credits to meet the core requirement are (circle 2 courses from the listed below):
   ECE 830: Embedded Cyber-Physical Systems
   ECE 820: Advanced Computer Architecture
   ECE 821: Advanced Power Electronics and Applications
   ECE 835: Advanced Electromagnetic Fields and Waves I
   ECE 851: Linear Control Systems
   ECE 863: Analysis of Stochastic Systems
   ECE 874: Physical Electronics

2. The six credits in areas such as Mathematics, Statistics, and Physics are:
   MTH 415, 421, 424, 425, 428H, 443, 451, 452, 461, 472,
   MTH 810, 828, 829, 841, 842, 848, 849, 850, 851, 852, 881
   STT 441, 442, 844, 861, 862
   PHY 425B, 471, 472, 810, 841, 842, 851, 852
   or other: _______________________________________________

3. The number of ECE 899 thesis credits are: ___________

4. Additional courses taken to meet breadth and depth interests are listed below (note these must include at least six credits from ECE courses at the 800 level or 900 level, not including ECE 801):

   _________________________________________________________

5. Check to make sure your program meets the University, College, and Department requirements as listed in the ECE Graduate Student Handbook and the MSU publication Academic Programs. Some important check list items are:
   - My advisor approves of these courses.
   - I will have the necessary prerequisites.
   - The courses are to be offered in the terms in which I plan to take them.
   - The total number of credits is at least 30.
   - All courses are at the 400 level or higher.
   - If Plan A (with thesis), the number of ECE 899 credits is between 4 and 8.
   - If Plan A (with thesis), the number of 800 level credits is at least 20.
   - If Plan B (course only), the number of 800 level credits is at least 18.
Appendix 2.2: Sample Master’s Degree Program Plans

The below sample plan meets all of the requirements for an ECE M.S. Plan A (Thesis Option) Degree.

Requirements:

1. 30 or more credits total of courses 400+ level: (all of the above courses contribute to this requirement).
2. 20 or more credits are 800 level courses or higher. The above courses that help satisfy this requirement include: (STT875, CSE848, ECE835, ECE851, ECE854, ECE863, ECE899, STT861) which is more than enough for this requirement.
3. 12 or more credits of ECE800 level courses or higher (excluding ECE801). The above courses that help satisfy this requirement include: (ECE835, ECE851, ECE854, ECE863, ECE899) which is more than enough for this requirement.
4. 6 or more credits from ECE core courses. The above courses that help satisfy this requirement include: (ECE835, ECE851, ECE863) which is more than enough for this requirement.
5. 6 or more credits from outside the college of engineering in courses from MTH, STT, and/or PHY at the 400 level or higher. The above courses that help satisfy this requirement include: (STT875, STT861) which is just enough to satisfy this requirement.
6. 4 – 8 credits of Master’s Thesis Research (ECE899). There are 6 credits of ECE899 above.
The below sample plan meets all of the requirements for an ECE M.S. Plan B (Course Only) Degree.

Requirements:

1. 30 or more credits total of courses 400+ level: (all of the above courses contribute to this requirement).
2. 18 or more credits are 800 level courses or higher. The above courses that help satisfy this requirement include: (STT875, CSE848, ECE835, ECE851, ECE854, ECE863, ECE874, STT861) which is more than enough for this requirement.
3. 12 or more credits of ECE800 level courses or higher (excluding ECE801). The above courses that help satisfy this requirement include: (ECE835, ECE851, ECE854, ECE863, ECE874) which is more than enough for this requirement.
4. 6 or more credits from ECE core courses. The above courses that help satisfy this requirement include: (ECE835, ECE851, ECE854, ECE863, ECE874) which is more than enough for this requirement.
5. 6 or more credits from outside the college of engineering in courses from MTH, STT, and/or PHY at the 400 level or higher. The above courses that help satisfy this requirement include: (STT875, STT861) which is just enough to satisfy this requirement.
Appendix 2.3: Sample Master’s Degree Transfer Credit Evaluation Form

Michigan State University
Credit Evaluation
Graduate Program

Name: Jane Doe 
PID: A12345678 

Credit from: University of Enlightenment 
Date taken: Fall 2019 

Total credits transferred: 9 
Equivalent number of MSU semester credits: 8 

College: Engineering 
Major: ECE 
Degree: M.S. (Plan A) 
Entered: Fall 2020 
Date: 7/31/2020 

Explanation and Instructions
This form is to be used for the evaluation of graduate credit earned at another accredited institution.

1. Listed in column (1) are graduate level subjects previously completed at another accredited institution.
2. In column (2) are the semester or term credits previously earned in subjects listed in column (1).
3. Column (3) may be used for those departments and/or college which desire to make a specific subject listing for evaluation purposes. There term credits equal two semester credits (e.g. Chemistry 800 – 6 term credits equal 4 semester credits).
4. In column (4) the department and/or college will indicate the number of semester credits to be accepted in transfer. (Subject by subject or by total only.) (400 level and 800 level courses should be identified here).
5. When the evaluation has been completed and approved by the dean’s Office, the original evaluation must be sent to the Admissions Office with an official transcript from the institution. Copies should be filed by the dean’s Office and the Departmental/Unit Office.
6. A copy of a transfer course summary worksheet will be sent to the student upon completion.

<table>
<thead>
<tr>
<th>(1) Transfer Subjects Course No. and Title</th>
<th>(2) Term Credits Sem. Credits</th>
<th>(3) Corresponding MSU Subjects Department Course No. Sem. Credits</th>
<th>(4) Accepted MSU Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 7995: Micro and Nano Fabrication</td>
<td>3 (Sem.)</td>
<td>ECE 877 3</td>
<td>3</td>
</tr>
<tr>
<td>ECE 723: Electromagnetics</td>
<td>3 (Term)</td>
<td>ECE 835 3</td>
<td>2</td>
</tr>
<tr>
<td>MTH 5862: Probability &amp; Statistics</td>
<td>3 (Sem.)</td>
<td>STT 861 3</td>
<td>3</td>
</tr>
</tbody>
</table>

Signature of Chairperson Date

Signature of Dean Date
Appendix 3 – Designing Your ECE Ph.D. Program

This document is intended to aid in designing your Ph.D. Program in Electrical and Computer Engineering. The program is to be filed within the first two semesters of your program.

1. You may wish to use the worksheet supplied in this appendix in planning your coursework.
2. After you and your guidance committee agree on a program of courses for your doctoral studies, use the SIS (https://student.msu.edu/splash.html) to submit your program.
3. The ECE Graduate Secretary will review the program to assure it meets our department requirements, such as satisfying the minimum number of credits, and approve or reject the program plan.
4. After the ECE Graduate Secretary approves the plan, it is automatically routed for approval to the student's advisor, guidance committee members, the department Associate Chair for Graduate Studies, the College of Engineering, and then the Graduate School.
Appendix 3.1: Worksheet: Planning Your ECE Ph.D. Program

1. List below the courses to be taken or courses that have been taken at MSU for your doctoral program. These courses must not have been used on other graduate degree or undergraduate degree programs (for example, do not list courses here that you took to earn a M.S. degree).

2. List below the courses used in previous graduate programs at MSU, or post-bachelor’s courses taken elsewhere, that your guidance committee have approved to be used toward the 36 credit post-bachelor’s degree minimum. (Note: these courses will be listed on the form “Supplement to the Report of the Guidance Committee”). All of these courses must be graduate level. Dual level (senior/grad) courses are not to be included. Enter the list of courses on the approved Supplement form in the Comments section in the Student Information System (SIS).

3. Check to make sure your program meets the University, College, and Department requirements as listed in the ECE Graduate Handbook and the MSU Academic Programs. Some important check list items are:
   - My advisor and the other members of my guidance committee approve of these courses.
   - I will have the necessary prerequisites.
   - The courses are to be offered in the terms in which I plan to take them.
   - The total number of credits is at least 36.
   - All courses are at the 800/900 level.
   - At least 3 of the credits are in mathematics, statistics, or physics.
   - All courses are on the numerical grading system, with the exception of up to 3 credits of M.S. thesis. Independent study is not used as part of the 36-credit minimum.
Appendix 3.2: Sample Doctoral Degree Program Plan

Courses listed on this plan must not include courses from other graduate degree plans. Do not include ECE 999 credits on this form.

After submission, your program plan will be routed electronically for approval.
Appendix 3.3: Sample Doctoral Degree Supplementary Report (Transfer Credits)

The approved form below represents 16 credits that count toward the 36 credit minimum beyond a B.S. degree.

Department of Electrical and Computer Engineering

SUPPLEMENT to the REPORT OF THE GUIDANCE COMMITTEE Form

Use this form to list post-bachelor’s courses accepted by your Guidance Committee towards the Departmental minimum course credit requirement. Attach to this form, the syllabus for each course listed. The syllabus should include a course description, the topics covered, and the textbook used in the course. In the Credits column, indicate if the course was taken on a semester (15 week course), or quarter system (10 week course). After your committee members sign below, return this form to the ECE Graduate Secretary (Meagan Kroll).

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 511</td>
<td>Engineering Electromagnetics</td>
<td>3 (Sem.)</td>
</tr>
<tr>
<td>EE 512</td>
<td>Integrated Optics</td>
<td>3 (Sem.)</td>
</tr>
<tr>
<td>EE 518</td>
<td>Manufacturing Methods in Microelectronics</td>
<td>3 (Sem.)</td>
</tr>
<tr>
<td>EE 566</td>
<td>Robust Control Theory</td>
<td>3 (Sem.)</td>
</tr>
<tr>
<td>ECE 530</td>
<td>Adaptive and Learning Systems</td>
<td>3 (Quarter)</td>
</tr>
<tr>
<td>MATH 521</td>
<td>Complex Analysis</td>
<td>3 (Quarter)</td>
</tr>
</tbody>
</table>

Joe Advisor [Signature]
7/31/2020
Advisor’s signature

[Signature]
7/31/20
Date
Committee member 1

[Signature]
7/31/20
Date
Committee member 2

[Signature]
7/31/20
Date
Committee member 3

[Signature]
7-31-2020
Date
Committee member 4

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Appendix 4 – Dual Major Doctoral Degrees

The Department of Electrical and Computer Engineering supports interdisciplinary Ph.D. programs centered on the student’s pursuit of an interdisciplinary dissertation topic. The primary goals of such a program are to foster cutting-edge interdisciplinary research and to provide an educational experience for these dual doctorate students that makes them highly qualified for their future careers.

Under MSU guidelines, research-based graduate degrees can be designed across disciplines/graduate programs, with the concurrence of the graduate programs involved (see Dual Major Doctoral Degrees at https://grad.msu.edu/interdisciplinaryprograms). The interdisciplinary graduate degrees outlined here involve the Department of Electrical and Computer Engineering together with another department (e.g., Physics), with one department being the student’s primary affiliation (the department to which he or she was admitted to MSU Graduate School) and the other a secondary affiliation. Admission requirements to graduate school are based on the primary department. A request for a dual major degree must be submitted within one semester following the admission into the Ph.D. program and within the first two years of the student’s graduate enrollment at MSU. This document represents a template for the overall requirements for the dual degree. The specific requirements depend on the agreements reached between the Electrical and Computer Engineering Department and the other department and stated in a subsidiary document. The remaining requirements depend on whether the Department of Electrical and Computer Engineering will be the primary or secondary affiliation for the student.

Appendix 4.1: Dual Major with ECE as Primary Affiliation

The requirements for a student pursuing a Ph.D. where Electrical and Computer Engineering is the major department are as follows.

1. The coursework must be satisfactory to the members of the advisory committee of both departments. The ECE department requires that the student take 36 credits post-bachelor’s degree at the 800 level and must take one course outside the department and college at the 800 level.
2. He/she must pass the Electrical and Computer Engineering Ph.D. qualifying exam and could request the replacement of one core course by another course that reflects the dual nature of the degree (with ECE Graduate Program Director approval).
3. The advisor must be a faculty member of either the primary or secondary department and the co-advisor must be from the other department.
4. The guidance committee must be comprised of at least five faculty members with at least three faculty members with > 50% appointments in the Department of Electrical and Computer Engineering and at least two faculty members from the secondary department.
5. Comprehensive examinations must be passed to the satisfaction of both departments.
6. The academic program was developed in consultation with the student. The guidance committee should be satisfied that the dissertation represents a contribution meeting the usual standards in both areas.
7. The Office of the Graduate School review will include the appropriateness of the guidance committee membership, the academic program, and the courses or credits applied to the two programs.
Appendix 4.2: Dual Major with ECE as Secondary Affiliation

The requirements for a student pursuing a Ph.D. where Electrical and Computer Engineering is the secondary department are as follows.

1. Regardless of whether admission status is regular or provisional, students whose undergraduate degree is not in Electrical Engineering, Computer Engineering, or a closely similar area must, during their course of study, take and receive a minimum grade of 3.0 in each of three PhD Qualifying Core courses from three different areas. Students who have taken an undergraduate junior- or senior-level course closely related to a PhD Qualifying Core course in their undergraduate program can petition the Graduate Studies Committee to have the corresponding course count toward meeting the proficiency requirement.

2. The advisor can be a faculty member of either the primary or secondary department and the co-advisor must be from the other department.

3. The guidance committee must be comprised of at least five faculty members with at least three faculty members from the primary department and at least two faculty members from the Department of Electrical and Computer Engineering.

4. The coursework must be satisfactory to both departments.

5. Four graduate level courses must be taken in Electrical and Computer Engineering and one must be a core course.

6. The Graduate Studies Committee in consultation with the Ph.D. Guidance Committee may require an Electrical and Computer Engineering Ph.D. qualifying exam and its format.

7. Comprehensive examinations must be passed to the satisfaction of both departments.

8. The academic program must be developed in consultation with the student. The guidance committee must be satisfied that the dissertation represents a contribution meeting the usual standards in both areas.

9. The Office of the Graduate School review will include appropriateness of the guidance committee membership, the academic program, and the courses or credits applied to the two programs.
Appendix 5 – Forms and Checklists

Links to each of the forms shown below can be found at:
https://ece.msu.edu/academics/graduate-programs

Appendix 5.1: New Student Checklist

New ECE Graduate Student Checklist

☐ Complete I-9 Form (This must be completed on or before the first day of employment at MSU.) – Forms are available at 103 International Center, online at (https://hr.msu.edu/ua/i9/index.html), and can be done in room 2325 Engineering Building (see Meagan Kroll, krollm@egr.msu.edu).
☐ University Email Account – see https://netid.msu.edu/activate for instructions on how to set up your university email account. This must be done before your Engineering College computer accounts can be set up.
☐ Engineering College Computer Account and Email – Division of Engineering Computing Services (DECS), 1325 Engineering Building, (https://www.egr.msu.edu/decs/)
☐ Apply for Social Security Card – Applications are available at the office for International Students & Scholars, 103 International Center, 353-1720.
☐ Graduate Employees Union Deduction/Authorization Form/Membership Card – All teaching assistants, except for those teaching assistants specifically excluded by the MSU/GEU agreement, must fill out this card and check-off of the option of either union membership dues or representation fees.
☐ Vehicle Registration – The Police & Public Safety Office is located at 870 Red Cedar Road (355-8440). You will need a copy of your vehicle registration and car insurance. If you are a TA/RA, you will need a copy of your Graduate Appointment Form, see Meagan Kroll (krollm@egr.msu.edu) in 2325 Engineering Building.
☐ Housing – 355-7457 (Student is responsible for housing arrangements)
☐ Contact Advisor

   Name: ___________________________ Room: _______________

   Phone: __________________________ Email: _______________________

☐ Enroll for Classes – see www.stuinfo.msu.edu
Appendix 5.2: Master’s Degree Transfer Credit Evaluation Form

Michigan State University
Credit Evaluation
Graduate Program

Name: ____________________________  PID: __________________
Credit from: ______________________  Date taken: __________________

Total credits transferred: ____________  Equivalent number of MSU semester credits: ____________
College: _________________________  Major: __________________  Degree: __________________
Entered: __________________________  Date: __________________

Explanation and Instructions
This form is to be used for the evaluation of graduate credit earned at another accredited institution.
1. Listed in column (1) are graduate level subjects previously completed at another accredited institution.
2. In column (2) are the semester or term credits previously earned in subjects listed in column (1).
3. Column (3) may be used for those departments and/or college which desire to make a specific subject listing for evaluation purposes. There term credits equal two semester credits (e.g. Chemistry 800 – 6 term credits equal 4 semester credits).
4. In column (4) the department and/or college will indicate the number of semester credits to be accepted in transfer. (Subject by subject or by total only.) (400 level and 800 level courses should be identified here).
5. When the evaluation has been completed and approved by the dean’s Office, the original evaluation must be sent to the Admissions Office with an official transcript from the institution. Copies should be filed by the dean’s Office and the Departmental/Unit Office.
6. A copy of a transfer course summary worksheet will be sent to the student upon completion.

<table>
<thead>
<tr>
<th>(1) Transfer Subjects Course No. and Title</th>
<th>(2) Term Credits Sem. Credits</th>
<th>(3) Corresponding MSU Subjects Department Course No. Sem. Credits</th>
<th>(4) Accepted MSU Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Signature of Chairperson  Date

Signature of Dean  Date
Appendix 5.3: Transfer from M.S. to Ph.D. Program

MICHIGAN STATE UNIVERSITY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

TRANSFER FROM M.S. TO Ph.D. PROGRAM

Request by Student:

__________________________________________  ____________  ____________
Name                                             Date                  PID

Electrical and Computer Engineering
Proposed Doctoral Area

I expect to complete the requirements for my M.S. degree in Electrical and Computer Engineering during the ______________ semester, and hereby request that I be considered for transfer to the indicated doctoral program.

__________________________________________
Signature

Department Action:

It is (recommended  not recommended ) that the transfer to the indicated doctoral program be approved.

Provisional requirements: __________________________________________

__________________________________________

Academic Advisor                                             Date

Department Chairperson / Associate Chair                  Date

Associate Dean                                              Date
Appendix 5.4: Transfer from Ph.D. to M.S. Program

MICHIGAN STATE UNIVERSITY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

TRANSFER FROM Ph.D. TO M.S. PROGRAM

Request by Student:

Name Date PID

Electrical and Computer Engineering
Proposed Master of Science Area

I expect to complete the requirements for a M.S. degree in Electrical and Computer Engineering during the ___________ semester, and hereby request that I be considered for transfer to the indicated Master of Science program.

________________________________________
Signature

Department Action:

It is (recommended not recommended) that the transfer to the indicated Master of Science program be approved.

Provisional requirements: ________________________________________________

________________________________________
Academic Advisor Date

________________________________________
Department Chairperson / Associate Chair Date

________________________________________
Associate Dean Date
Appendix 5.5: Comprehensive Form

MICHIGAN STATE UNIVERSITY

RECORD OF COMPREHENSIVE EXAMINATIONS
for
DOCTORAL DEGREE AND EDUCATIONAL
SPECIALIST DEGREE CANDIDATES

☐ Check if this is a re-examination because of expired time limits.

Department of Electrical and Computer Engineering

Student’s Name: ___________________________ Student Number: ___________________________

Last, First, Middle initial

Term and Year of First Course Counted towards this Degree: __________________________

Results of Written Comprehensive Examinations:

<table>
<thead>
<tr>
<th>Field (Dept.)</th>
<th>Examiner (Print &amp; Sign)</th>
<th>Examination Date (MM-DD-YY)</th>
<th>Passed or Failed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results of Oral Comprehensive Examinations:

<table>
<thead>
<tr>
<th>Field (Dept.)</th>
<th>Examiner (Print &amp; Sign)</th>
<th>Examination Date (MM-DD-YY)</th>
<th>Passed or Failed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OVERALL PASS or FAIL? ___________________________

Signed: ___________________________
Chairperson of Examination Committee
Date

Signed: ___________________________
Chairperson of the Department (or designee)
Date

Signed: ___________________________
Dean of College (or designee)
Date

MSU is an Affirmative Action/Equal Opportunity Employer.
MICHIGAN STATE UNIVERSITY
APPLICATION FOR INDEPENDENT STUDY

NAME: ________________ Last Name  First Name  Middle Initial  DATE: ________________

PID: __________ LEVEL: __________ CLASS: __________  MAJOR: __________ CUMULATIVE GPA: __________

COURSE: __________  SECTION: __________  CREDITS: __________

SEMESTER: __________

Number of Independent Study credits to be earned this semester: __________

Total of prior Independent Study credits: __________

1. DESCRIPTION (Subject matter, purpose, methods)

2. RATIONALE (Why independent study rather than regular course?)

3. PREPARATION (Relevant course work, reading, work experience, etc.)

4. WORK TO BE COMPLETED
   
   (a) Type and amount of reading, writing, lab work, etc.

   (b) Estimated contact hours per week with instructor:

   (c) Deadline for submitting work for final evaluation:

   (d) Evaluation procedure:

STUDENT'S SIGNATURE __________________________  PHONE ________________

APPROVALS

Instructor Signature __________________________  Date ________________

Academic Advisor __________________________  Date ________________

Chairperson, Department Offering Course __________________________  Date ________________

Version – 10/14/15
Appendix 5.7: Master’s Defense Form

Michigan State University
College of Engineering

Name: ______________________ Student PID: ________________

THESIS/PROJECT FOR M.S. DEGREE:

First Semester in Master’s Program: ______________
Major: _______________________________ Plan: Plan A (Thesis Option)
Thesis/Project Title: ________________________________

<table>
<thead>
<tr>
<th>Committee Member</th>
<th>Dept.</th>
<th>Signature</th>
<th>Defense Date</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ECE</td>
<td></td>
<td></td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>ECE</td>
<td></td>
<td></td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pass</td>
</tr>
</tbody>
</table>

Overall Performance: □ Pass  □ Fail
Grade: ______________

COMMENTS:

-------------------
Guidance Committee Chairperson     Date               Dept. Chair / Grad. Coordinator     Date
-------------------
Associate Dean               Date

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Appendix 5.8: Pre-Travel Authorization Form

<table>
<thead>
<tr>
<th>MICHIGAN STATE UNIVERSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>PRE-TRIP AUTHORIZATION</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>SECTION A: TRAVEL AUTHORIZATION</strong></td>
</tr>
<tr>
<td>This section must be completed prior to departure.</td>
</tr>
<tr>
<td>Name: ____________________ (Last) ____________________ M 888 888</td>
</tr>
<tr>
<td>Email: ____________________</td>
</tr>
<tr>
<td>Department: ____________________ Electrical and Computer Engineering</td>
</tr>
<tr>
<td>Dept. Addr: 450 E. Shaw Lane, Room 210 E, Engineering Building, East Lansing, MI 48824</td>
</tr>
<tr>
<td>Check One: US Citizen, Resident Alien, Non-Resident Alien</td>
</tr>
<tr>
<td>Check One: Faculty/Staff, Graduate, Undergraduate, Other</td>
</tr>
<tr>
<td>Departure Date: ________________</td>
</tr>
<tr>
<td>Return Date: ________________</td>
</tr>
<tr>
<td>Destination/Offer State and Country Required: ____________________</td>
</tr>
<tr>
<td>Account Number to be charged: ____________________</td>
</tr>
<tr>
<td>Purpose of Travel (Check all that apply and list description): Conference/Meeting, Research, International Programs, Recruitment, External Relation/Development, Teaching/Outreach, Other</td>
</tr>
<tr>
<td>Hotel Reimbursed: [ ] MSU Funds, [ ] Non-MSU Funds</td>
</tr>
<tr>
<td>Description: ____________________</td>
</tr>
</tbody>
</table>

| **SECTION B: ESTIMATED TRIP COSTS** |
| Actual | Lodging | Ground Transport | Meal/Per Diem/ME \& | Program Expenses | Student Related Expenses |
|_____ | ______ | ______ | ______ | ______ | ______ |
| Airfare | ______ | ______ | ______ | ______ | ______ |
| Ground Transport | ______ | ______ | ______ | ______ | ______ |
| Meal/Per Diem/ME | ______ | ______ | ______ | ______ | ______ |
| Program Expenses | ______ | ______ | ______ | ______ | ______ |
| Student Related Expenses | ______ | ______ | ______ | ______ | ______ |
| Total Estimate: $ ______ |

| **SECTION C: MOTOR POOL - CAR USAGE** |
| The section is to be filled out when a motorized vehicle is a motorized vehicle. |
| Name of Additional Driver: ____________________ |
| Driver: ____________________ |
| Mileage: ____________________ |
| Date: ________________ |

| **SECTION D: EMERGENCY CONTACT INFORMATION** |
| As Required by College/Unit or Administrative Unit (MAUI) |
| Emergency Contact: ____________________ |
| Emergency Contact Phone: ____________________ |

| **SECTION E: TRAVELER RIGHTS** |
| The consumer has certain legal rights under federal and state laws. The protections that the consumer may have vary by state. |

| **SECTION F: TRAVELER SERVICES** |
| Include the name of the travel services provider and the contact information. |

| ____________ | ____________ |
| Press F15 | Help |
Ph.D. Qualifying Examination, Part B
Report of the Examining Committee

Department of Electrical and Computer Engineering
Michigan State University

Date: _______________

Student Name: ________________________________________ PID #: __________

Title of Assigned Research Topic: ______________________________________

Evaluation Measures

<table>
<thead>
<tr>
<th><strong>Technical Content</strong></th>
<th><strong>Document</strong></th>
<th><strong>Presentation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem statement; description of topic</td>
<td>Acceptable</td>
<td>Unacceptable</td>
</tr>
<tr>
<td>Background study; state of the art</td>
<td>Acceptable</td>
<td>Unacceptable</td>
</tr>
<tr>
<td>Analysis and understanding</td>
<td>Acceptable</td>
<td>Unacceptable</td>
</tr>
<tr>
<td>Citations and references</td>
<td>Acceptable</td>
<td>Unacceptable</td>
</tr>
<tr>
<td>Originality</td>
<td>Acceptable</td>
<td>Unacceptable</td>
</tr>
<tr>
<td>Ethics of content</td>
<td>Acceptable</td>
<td>Unacceptable</td>
</tr>
</tbody>
</table>

Comments (must be provided if any measure is unacceptable):

Writing Skills

| **Organization**                          | Acceptable | Unacceptable |
| **Vocabulary**                            | Acceptable | Unacceptable |
| **Grammar and syntax**                    | Acceptable | Unacceptable |

Comments (must be provided if any measure is unacceptable):
Appendix 5.10: Override Form

---

**COLLEGE OF ENGINEERING**

**Request for Course Override**

<table>
<thead>
<tr>
<th>NAME:</th>
<th>PID:</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE:</td>
<td>SECTION:</td>
</tr>
</tbody>
</table>

**Step 1: Check Your Major**
- □ Biosystems
- □ Chem. Eng. & Mat. Sci
- □ Civil & Environmental Eng.
- □ Computer Science & Eng.
- □ Electrical & Computer Eng.
- □ Mechanical Engineering
- □ Other (List) ____________

**Step 2: Check Your Level/Class**
- □ Undergraduate
- □ Freshman
- □ Sophomore
- □ Junior
- □ Senior
- □ Graduate
- □ Masters
- □ Ph.D.

**Step 3: Check Enrollment Level**
- □ The section is NOT full.
- □ The section is full, and I have verified that there are seats left in the room to accommodate this override.

**Step 4: Check for Corequisite or Prerequisite (Filled out by Instructor)**
- □ The student has the corequisite or prerequisite.
- □ The student is missing a corequisite or prerequisite for this course.

Instructor’s Signature: ______________ Date: ______________

Department Graduate or Undergraduate Coordinator Signature: ______________
Appendix 5.11: Supplement Form

Department of Electrical and Computer Engineering

SUPPLEMENT to the REPORT OF THE GUIDANCE COMMITTEE Form

Use this form to list post-bachelor’s courses accepted by your Guidance Committee towards the Departmental minimum course credit requirement. Attach to this form, the syllabus for each course listed. The syllabus should include a course description, the topics covered, and the textbook used in the course. In the Credits column, indicate if the course was taken on a semester (15 week course), or quarter system (10 week course). After your committee members sign below, return this form to the ECE Graduate Secretary (Meagan Kroll).

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credits</th>
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Advisor’s signature __________ Date __________

Committee member 1 __________ Date __________
Committee member 2 __________ Date __________

Committee member 3 __________ Date __________
Committee member 4 __________ Date __________
## Student Hourly Time Sheet

**Electrical & Computer Engineering**

Must have authorized signature and account number to be valid.

<table>
<thead>
<tr>
<th>Name (print):</th>
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<tbody>
<tr>
<td>Employee Signature:</td>
</tr>
<tr>
<td>Supervisor’s Name:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time Period</th>
<th>1st Week</th>
<th>Hours</th>
<th>Date</th>
<th>2nd Week</th>
<th>Hours</th>
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<td>TIME DUE</td>
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</tbody>
</table>

**Time sheets due at ECE by 5 p.m. on alternate Fridays. (Same day as payday). TIME SHEETS WILL NOT BE ACCEPTED OR PROCESSED WITHOUT SUPERVISORS SIGNATURE. Close to Holidays, watch for announcement or call ECE to verify submission deadline.**

<table>
<thead>
<tr>
<th>Date</th>
<th>1st Week</th>
<th>Hours</th>
<th>Date</th>
<th>2nd Week</th>
<th>Hours</th>
<th>Total</th>
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</tbody>
</table>

**Supervisor’s Signature __________________________**

**Account Number __________________________**

**Phone: 355-5066  FAX: 353-1980**
# Appendix 5.13: ECE Qualifying Exam – Part A Form

Department of Electrical and Computer Engineering  
Ph.D. Qualifying Exam Part A - Core Courses Form

Ph.D. Qualifying Exam Part A - Core Courses Are:

<table>
<thead>
<tr>
<th>Area</th>
<th>Fall semester</th>
<th>Spring semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electromagnetics</td>
<td>ECE 835: Advanced Electromagnetic Fields and Waves I</td>
<td>ECE 850: Electrodynamics of Plasmas</td>
</tr>
<tr>
<td>Materials and Devices</td>
<td>ECE 874: Physical Electronics</td>
<td>ECE 875: Electronic Devices</td>
</tr>
<tr>
<td>Microelectronics</td>
<td>ECE 832: Analog Integrated Circuit Design</td>
<td></td>
</tr>
<tr>
<td>Computing</td>
<td>ECE 830: Embedded Cyber-Physical Systems (yet to be approved by ECE faculty)</td>
<td>ECE 816: Cryptography and Network Security</td>
</tr>
<tr>
<td>Controls &amp; Robotics</td>
<td>ECE 851: Linear Systems and Control</td>
<td>ECE 818: Robotics</td>
</tr>
<tr>
<td>Communications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the above table of courses, list below the three courses for your Part A qualifying exam.

Course #1: __________________________ Semester Taken: _________ Grade Received: __________

Course #2: __________________________ Semester Taken: _________ Grade Received: __________

Course #3: __________________________ Semester Taken: _________ Grade Received: __________

Return this form with the above information filled in to the ECE Graduate Secretary, Meagan Kroll (krollnm@egr.msu.edu) in room 2325 Engineering Building.

---------------------------------------------------------------

YES  NO

☐ ☐ Each course grade above is 3.0 or higher.

☐ ☐ The average grade for the three courses above is 3.5 or higher.

☐ ☐ The courses listed above were completed within 2 years of entering the ECE Ph.D. Program.
PhD Defense Presentation

Friday, March 2, 2021
2:00pm – 4:00pm
2219 Engineering Building
ECE Conference Room

“Title of the Dissertation”

By

Student’s Name

Advisor: Advisor’s Name

Abstract

Describe the objectives of the doctoral research and the scientific outcomes.

Journal Publications:
1. Author 1, Coauthor 1, and Coauthor 2, “Title of the publication”, *Name of the Journal*, vol. XX, no. XX, (Mon. Year), pp. XXX-XXX.

Journals under Review:
1. Author 1, Coauthor 1, and Coauthor 2, “Title of the publication”, *Name of the Journal*, vol. XX, no. XX, (Mon. Year), pp. XXX-XXX.

Books/Book Chapters:
1. Author 1, Coauthor 1, and Coauthor 2, “Title of the chapter”, *Name of the book*, (ed. Editor’s names). Publisher Name, Year of the Publication, ISBN.
2. Author 1, Coauthor 1, and Coauthor 2, *Name of the book*, Publisher Name, Year of the Publication, ISBN.

Patents:
1. Inventor 1, Inventor 2, and Inventor 3, “Title of the invention”, US patent no. XXXX, Issued on Mon. DD, YYYY.

Conference Proceedings:
1. Author 1, Coauthor 1, and Coauthor 2, “Title of the publication”, *Name of the Conference Proceedings*, vol. XX, no. XX, (Mon. Year), pp. XXX-XXX.

Conference Presentations and Meeting Abstracts:
1. Author 1, Coauthor 1, and Coauthor 2, “Title of the publication”, *Name of the Meeting*, Location of the meeting, (Month Year).
Appendix 5.15: Dual Ph.D. Request Form with ECE

Page 1 of the 3-page form is shown below:

DUAL PHD REQUEST FORM

ELECTRICAL & COMPUTER ENGINEERING

The purpose of this form is (1) to help you plan your dual PhD in your primary and secondary departments and (2) to ensure that both departments are aware of your intent to do so, and to make you aware of opportunities that may be available to you because of this. This form should be completed in consultation with your guidance committee during your first thesis committee meeting and returned either in person or via email to the Graduate Director (Associate Chair for Graduate Studies).

IMPORTANT: As described in the university guidelines on Dual Major Doctoral Degrees, “All dual major doctoral degrees must be approved by the Dean of the Graduate School. A request for the dual major degree must be submitted via GradPlan within one semester following its development and within the first two years of the student’s enrollment at Michigan State University; Most critically, the intent to receive the degree in two areas must be outlined in the guidance committee report, and the PhD Degree Plan must reflect the required standards of both departments. Approval via GradPlan must come from the Graduate Directors of both departments, the College of the student’s primary graduate program and the College of Engineering, and the Dean of the Graduate School. If you have any questions about this, please contact the ECE Associate Chair for Graduate Studies.

In addition to the course requirements discussed in this document, please note that students pursuing a dual PhD must have a dissertation project that significantly incorporates the practices and knowledge of both disciplines. As such, the request for a dual PhD with ECE must be justified during your first committee meeting, and will be evaluated annually by your dissertation committee. Students whose work is deemed to be lacking sufficient aspects of their secondary field will not be allowed to receive the dual PhD.

Once this form is completed and signed, you must initiate the Dual Major Request in your GradPlan.

Student’s Name: ___________________________  PID: ___________________________

Student Net ID: ____________@msu.edu

Current Program (major code and program name): ________________________________

Dissertation advisor(s): ______________________________________________________

Advisor Net ID: ________________@msu.edu

Degree Pursued (e.g., “Dual PhD in ECE and ESPP”): ____________________________

Primary Department: _________________________________________________________

Secondary Department: _______________________________________________________