

NORTH DAKOTA STATE UNIVERSITY

Graduate Handbook

Electrical and Computer Engineering

2017

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

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1. Program Overview

The Department of Electrical & Computer Engineering (ECE) at North Dakota State University (NDSU) offers three graduate degrees in Electrical & Computer Engineering: Master of Science (M.S.), Master of Engineering (M.E.), and Doctor of Philosophy (Ph.D.). This handbook includes the policies and procedures that apply specifically to the ECE graduate program. Relevant graduate school policies are included here for convenience. Students must also refer to the documentation provided by the NDSU Graduate School for the policies and procedures that apply to all graduate students.

2. Application Process

All applicants are required to submit an online application with all supporting materials to the NDSU Graduate School. The entire application process is managed online (follow https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=ndusndsugr for instructions).

Please **DO NOT** mail application materials to the Department.

2.1 Eligibility

Applicants must possess a Bachelor's or Master's degree in Electrical Engineering or Computer Engineering from an institution recognized by NDSU. Those who do not have such a degree may be admitted into the NDSU ECE graduate program, but may be required to complete some undergraduate deficiency courses prior to enrolling in graduate courses.

2.2 Deadlines

ECE accepts applications for both spring and fall. The deadlines are October 15 for spring and February 28 for fall.

2.3 Admission Requirements

A. TOEFL Requirements

- If you are an international applicant:

The TOEFL or IELTS is required. The Graduate School requires a minimum TOEFL score of 525 (paper-based) or 71 (Internet-based), or a minimum IELTS score of 6. To qualify for departmental support with a Graduate Teaching Assistantship (GTA) or grader position, the minimum requirements are:

Position	TOEFL Total	TOEFL Speaking	TOEFL Writing	IELTS
Grader	79	19	21	6.5
TA	81	23	21	7

- If you are a domestic applicant:

Domestic applicants and international applicants possessing a U.S. bachelor's degree or higher are exempt from TOEFL/IELTS requirements provided their U.S. degree included a minimum of two years in residence.

B. GRE Requirements

There are two avenues to be admitted as an ECE M.S. or Ph.D. student:

The ***preferred avenue*** is to contact and work with an NDSU ECE Professor before coming to NDSU, such that the professor recommends you for admittance into the program. Each professor will have different expectations for the amount and type of work he/she will require you to do in order for him/her to recommend you for admittance into the NDSU ECE graduate program. Please look at each faculty's website (<http://www.ndsu.edu/ece/people/faculty/>) and contact a faculty member working in a research area in which you are interested in pursuing your graduate studies.

A ***secondary avenue*** is to have a GRE score of at least 145 Verbal and 155 Quantitative and a minimum GPA of 3.0 on your latest Electrical Engineering or Computer Engineering degree, either B.S. or M.S. The GRE subject area test is not required.

To be admitted as an ECE M.E. student, you must have a GRE score of at least 145 Verbal and 155 Quantitative and a minimum GPA of 3.0 on your Electrical Engineering or Computer Engineering B. S. degree. The 3.0 minimum GPA admission requirement may be waived for M.E. students with substantial ECE industry experience. The GRE subject area test is not required.

2.4 Notification of Acceptance

Application reviews are conducted in the first week of April for fall admissions and the first week of November for spring admissions. Applicants are then electronically notified by the graduate school.

2.5 Financial Aid

Support for graduate students can come from the ECE department or through research grants. Any graduate student working 10 or more hours for the department (or any other department) at NDSU may receive a tuition waiver in addition to their salary. Federal regulations prohibit graduate students working more than 20 hours per week for the university.

Students with quarter-time (10 hours/week) support in the form of a GTA or GRA (Graduate Research Assistant) automatically receive a full tuition waiver. Most GTAs are typically offered quarter-time appointments plus a grader position for additional salary. GRA appointments are typically half-time (20 hours/week). Stipends for RAs range from \$1,000 to \$1,500 per month for M.S. students, and typically \$1,500 per month or higher for doctoral students. For additional funding opportunities, please see: http://www.ndsu.edu/gradschool/current_students/fellowships_and_awards/.

2.6 Evaluation of Communication Proficiency

Per graduate school policy, all students awarded a GTA involving any type of teaching responsibility, including lectures, labs, or tutoring shall be evaluated with respect to overall communication proficiency during the 3rd week of the first semester of his or her teaching duties.

ECE will conduct such an evaluation (before the third week) for technical (lab) and communication proficiency, and declare either satisfactory or unsatisfactory. In the latter case, the department in consultation with the graduate school will review the terms of the assistantship initially offered to the student and enforce remedial measures.

3. Master of Science Program

3.1 Program Objectives

The M.S. program is designed to strengthen a student's understanding in the broad field of ECE, while providing the student with in-depth knowledge in at least one area of ECE, and introduce a student to the research process. A graduate of the M.S. ECE program is perfectly poised to continue graduate studies in a Ph.D. program or pursue an ECE career in industry, starting in a better position with a higher salary than a B.S. graduate. ***An M.S. student who has received any form of support from NDSU (e.g., GTA, GRA, grader, fellowship, etc.) is NOT allowed to switch to an M.E. degree. An M.S. student who has not received any support from NDSU may switch to an M.E. degree only after receiving written approval from his/her major advisor.***

3.2 Coursework

A minimum of 6 credit hours of M.S. thesis (ECE 798), and a minimum of 24 credit hours of graduate coursework subject to the following limitations and approved by the student's supervisory committee:

- including ECE 702 (1 credit hour), to be taken in the first year
- including at most 6 hours of independent study, 796 or 896
- including at least 15 hours of ECE courses
- including at least 6 hours of didactic ECE 7xx courses, which excludes ECE 796
- students who complete the BS/MS program at NDSU with a GPA of 3.5 or above may count up to 6 hours of graduate level ECE courses taken during their B.S. program toward this requirement

3.3 Transfer Credits

All graduate credits used to meet the requirements of an M.S. degree must be approved by the supervisory committee, the ECE graduate coordinator, the academic dean, and the Dean of the Graduate School. A candidate for the M.S. degree must petition in order to transfer up to a maximum of 9 semester hours of graduate credit from another institution to satisfy course requirements on their plan of study. A student may use up to 9 credit hours taken as a non-degree NDSU graduate student towards the degree.

3.4 Plan of Study

The plan of study is comprised of two main items:

- Course selection (subject to the regulations described in 3.2 above) deemed necessary to prepare the student. This is developed primarily by the student and his/her major advisor, and requires approval by the student's supervisory committee.
- A supervisory committee: The committee is constituted per graduate school policy as follows:

The committee will have at least four members. The members consist of:

- The major adviser, who must be a full or associate member of the graduate faculty. The student selects the adviser with approval of the ECE graduate coordinator and the Dean of the Graduate School. The major adviser-student relationship must be a mutually acceptable one. The major adviser will act as the chair of the student's supervisory committee and will be in charge of the Plan of Study. The remaining members of the committee must be agreed upon by the student, the major adviser, and the Dean of the Graduate School.
- A second member, who must be a full or associate member of the graduate faculty.
- A third member, who could be either a faculty member or a qualified off-campus expert in the field. If this committee member is not a full or associate member of the graduate faculty, the approval of the Dean of the Graduate School is required. Approval by the dean requires a recommendation from the ECE graduate coordinator accompanied by rationale and a curriculum vitae.
- The Graduate School appointee, who must be a full member of the NDSU graduate faculty from outside the student's program. This appointment is made by the Dean of the Graduate School, but suggestions as to whom the appointee might be are welcome. The role of the Graduate School appointee is to ensure that the student's Plan of Study follows Graduate School guidelines and that other Graduate School policies are observed. The Graduate School appointee also ensures that the expectations for the student's performance are reasonable and that interactions with the supervisory committee are conducted on a professional basis.

NOTE: Other qualified individuals may participate as committee members following approval by the Graduate Dean upon a recommendation, accompanied by rationale and curriculum vitae, by the ECE graduate coordinator and academic dean.

The supervisory committee agreed upon by the major adviser and student, and approved by the ECE graduate coordinator and the academic dean shall be recommended to the Dean of the Graduate School for final approval.

Per graduate school policy, the plan of study must be approved by the ECE graduate coordinator and the Dean of the Graduate School. It must be submitted to the Graduate School for approval not later than the term immediately after the supervisory committee is formed and must be filed in the Graduate School prior to scheduling the final examination. Revisions may be made later as advisable and necessary, but must be approved by the student, all supervisory committee members, the ECE graduate

coordinator, and the graduate dean. The graduate dean will officially notify the student, supervisory committee, and ECE graduate coordinator of all changes.

The complete policy is noted at (http://www.ndsu.edu/gradschool/graduate_bulletin/graduate_school_policies/masters/#c75245)

3.5 M.S. Thesis

This degree is research oriented and the student is expected to make original contributions to the field of study. This final thesis often includes:

- A problem statement (the objective or hypothesis of the thesis),
- An explanation of the current state-of-the-art relevant to this problem, and
- Presentation of the new knowledge created by the student in meeting this objective or testing this hypothesis.
- M.S. thesis work must be of significant quality and novelty to warrant publication in an appropriate peer-reviewed conference or journal. Hence, an M.S. thesis student must work closely with both their major advisor and supervisory committee as they progress on their research. Significant guidance from the student's major advisor and supervisory committee is expected since this is often a student's first exposure to the research process.

3.6 Final M.S. Thesis Defense

The candidate shall pass a final oral examination before being awarded the M.S. degree. The supervisory committee shall serve as the examining committee of which the major adviser shall serve as chair. Substitutions must be approved by the Dean of the Graduate School.

The final examination shall cover the thesis and knowledge fundamental thereto. The candidate shall prepare for each member of the committee a written statement describing the Plan of Study, i.e., a list of courses, instructors, credits, grades, and dates taken. Permission to schedule the examination must be requested of the Graduate School by the student's major adviser using the Request to Schedule Examination form. **The request to schedule must be received by the Graduate School at least two (2) weeks prior to the examination.** Notification by the Graduate School will confirm the scheduled examination.

The thesis in a near final form must be given to the committee members no fewer than seven (7) days prior to the examination. If this seven (7) day stipulation cannot be met, the student must either secure the concurrence of all committee members or reschedule the examination. At the conclusion of the examination, the examining committee shall record, in writing, approval or disapproval. The Report of Final Exam must be filed with the Graduate School within seven (7) days of the exam.

Continuous enrollment is required until all degree requirements are completed, including submitting final copies of the thesis. ***You have 7 years from the day you start to complete your M.S. degree.*** To participate in commencement, the student must have passed the final examination seven days prior to the commencement ceremony.

3.7 Publication Requirement

All M.S. students are required to submit their work to at least one peer reviewed journal or conference prior to their final thesis defense. Acceptable journals/conferences are left up to the student's major advisor and supervisory committee.

3.8 Submission of Final Thesis

After the final examination, the student incorporates into the thesis corrections suggested at the oral examination. The student, major advisor, and ECE graduate coordinator then sign the Checklist for Dissertations, Theses, and Papers; and one copy of the thesis, printed on regular paper, is presented to the Graduate School for approval. This copy must be accompanied by a receipt from the Customer Account Services for the completion package. After approval, 5 final copies of the thesis, on the required paper, are to be presented, unbound, to the Graduate School. Two bound copies of the thesis go to the university library. The remaining 3 bound copies are for the student, the student's adviser, and the ECE Department.

The student will have 1 year from the date of the final examination to deliver the 5 final copies to the Graduate School and complete all other degree requirements. Should the thesis not be deposited as specified, or any other degree requirements not be completed, the student must retake the final examination. If a period of time two years or greater lapses before the final copies are submitted, the student must reapply to the Graduate School and must register for a minimum of 2 credit hours. Degree date is based on the date when **final** copies are submitted to the Graduate School.

4. Master of Engineering (M.E.) Program

4.1 Program Objectives

The M.E. is a coursework only program designed for students who are typically working in industry, to strengthen a student's understanding in the broad field of ECE, and potentially provide the student with in-depth knowledge in one or more ECE areas, depending on the student's selection of courses. A graduate of the M.E. ECE program is well poised to pursue an ECE career in industry, in a better position with a higher salary than a B.S. graduate. **Students in the M.E. program are not eligible to receive support from NDSU in the form of teaching assistantships, research assistantships, or tuition waivers. M.E. students are eligible to switch to an M.S. degree only if an ECE faculty member agrees to be their major advisor.**

4.2 Coursework

A minimum of 30 credit hours of graduate coursework subject to the following limitations and approved by the graduate coordinator:

- including at most 6 hours of independent study, 796 or 896
- including at least 18 hours of ECE courses
- including at least 12 hours of 7xx/8xx courses

- students who complete the combined BS/MS program at NDSU with a GPA of 3.5 or above may count up to 6 hours of graduate level ECE courses taken during their B.S. program toward this requirement

4.3 Transfer Credits

All graduate credits used to meet the requirements of a M.E. degree must be approved by the ECE graduate coordinator, the academic dean, and the Dean of the Graduate School. A candidate for the M.E. degree must petition in order to transfer up to a maximum of 9 semester hours of graduate credit from another institution to satisfy course requirements on their plan of study. A student may use up to 9 credit hours taken as a non-degree NDSU graduate student towards the degree.

4.4 Plan of Study

The plan of study is the course selection (subject to the regulations described in 4.2 above). This is developed primarily by the student, with assistance from the ECE graduate coordinator, who acts as the M.E. student's major advisor.

4.5 Preparing for Graduation

M.E. students must complete the Application for Graduate Degree form and submit it to the Graduate School the semester in which the degree will be completed. There is a \$25 processing fee that may be paid online. No transcript or diploma will be issued until this fee is paid. ***You have 7 years from the day you start to complete your M.E. degree.***

5. Doctor of Philosophy (Ph.D.) Program

5.1 Program Objectives

The Ph.D. program is designed to ensure that a student has a good understanding of fundamental areas within ECE, while providing the student with in-depth knowledge in at least one area of ECE, and teaching the student the entire research process, such that he/she is capable of performing independent research. A graduate of the Ph.D. ECE program is perfectly poised to pursue an ECE career in academia, a national lab, or industry, working in research and development. ***A direct admit Ph.D. student (i.e., has a B.S. but not an M.S. degree) who has received any form of support from NDSU (e.g., GTA, GRA, grader, fellowship, etc.) is NOT allowed to switch to an M.E. degree; he/she may switch to an M.S. degree only after receiving written approval from his/her major advisor.***

5.2 Coursework

A minimum of 90 combined credit hours (60 credit hours beyond a Master's degree) of graduate course work, M.S. thesis (ECE 798), and Ph.D. dissertation (ECE 799), subject to the following constraints:

- at most 6 credit hours of M.S. thesis (ECE 798) taken during the M.S. degree
- at least 30 credit hours of Ph.D. dissertation (ECE 799)
- at least 39 credit hours of graduate course work subject to the following limitations and approved by the student's supervisory committee. Note that graduate courses taken during the

M.S. degree count as part of these 39 hours, subject to approval of the student's supervisory committee and the graduate school.

- including ECE 702, to be taken in the first year
- including at most 12 hours of independent study, 796 or 896
- including at least 15 hours of didactic 7xx/8xx courses taken at NDSU, which excludes independent study, 796 or 896
- including at least 9 hours of didactic ECE 7xx courses, which excludes ECE 796
- including at least 6 hours outside ECE
- students who complete the combined BS/MS program at NDSU with a GPA of 3.5 or above may count up to 6 hours of graduate level ECE courses taken during their B.S. program toward this requirement

5.3 Transfer Credits

All graduate credits used to meet the requirements of a doctoral degree must be approved by the supervisory committee, the ECE graduate coordinator, the academic dean, and the Dean of the Graduate School. No more than 12 credit hours may be transferred by the petition process. Course work that is transferred does not reduce the total requirement of 60 credits for students with a master's degree in the same discipline.

5.4 Plan of Study

The requirements are identical to those described for the M.S. program (see Section 3.4).

5.5 Qualifying Exam

The purpose of the qualifying exam (QE) is to ensure that the Ph.D. student has sufficient knowledge in at least 4 fundamental areas of ECE before being awarded a Ph.D. in ECE. The written QE is offered once per year toward the beginning of the Fall semester (normally sometime in September). All PhD students are required to take the QE in the subsequent Fall semester after starting the ECE PhD program and pass all portions of the exam before the following Fall semester, in order to be eligible for continued support as an ECE TA or grader. For example, if you started at NDSU in Fall 2014 or Spring 2015, you must take the QE in Fall 2015, and either pass all 4 sections of the QE with at least a 70%, or pass (with an A or B) the corresponding course(s) for sections you failed before Fall 2016. If you skip taking the QE in Fall 2015, you will not be eligible for TA/grader support in Spring 2016 or thereafter until you satisfy all QE requirements. If you take the QE in Fall 2015, but fail one or more sections, you are still eligible for TA/grader support in Spring 2016, but will only be eligible for TA/grader support in Fall 2016 if you pass (with an A or B) all corresponding course(s) for sections you failed before Fall 2016.

The Ph.D. qualifying exam consists of four 2-hour written exams covering fundamental undergraduate ECE material in 4 of the following areas, selected by the student, with approval from his/her major advisor:

Circuits I
Digital Design
Electronics I
Random Processes
Signals & Systems
Applied Electromagnetics
Energy Conversion

Embedded Systems: non-processor specific assembly and C language programming
Computer Organization
Data Structures and Algorithms
Other, as approved by student's supervisory committee

To pass, the student must achieve a score of 70% or above on each of the 4 chosen exams. If a student does not pass one or more exams, the student must take the corresponding undergraduate class(es) the next time offered and pass the course(s) with a grade of A or B. Note that undergraduate courses may not be covered by a student's tuition waiver; therefore, the student may have to pay to take an undergraduate course him/herself. Failure to pass the Ph.D. qualifying exam will result in dismissal of the student from the Ph.D. program.

Exam topic syllabi along with a sample QE for each topic area can be downloaded at http://www.ndsu.edu/fileadmin/ece/info/QE_prep.zip to help you prepare for the QE.

5.6 Candidacy Exam

The purpose of the candidacy exam is to ensure that the student has sufficient understanding of the technical literature in his/her field, and has formulated a research topic and plan that is sufficient for earning an ECE Ph.D. degree. The candidacy exam consists of a written (15 page max) and oral (approximately 30 minutes plus questions) proposal for his/her Ph.D. research, which is evaluated by his/her supervisory committee. This research proposal should include:

- objective of the student's work or the hypothesis he/she wishes to investigate
- explanation of why this topic is significant
- explanation of what others have done in the area
- explanation of how the student proposes to attack this problem
- preliminary results, and submitted, accepted, and published papers, if any
- expected results and implications

The written proposal must be given to the supervisory committee at least 7 days before the oral exam. A student must pass the qualifying exam before taking the candidacy exam. The candidacy exam is typically taken after most all courses have been completed, and must be taken at least one semester prior to the dissertation defense. Permission to schedule the oral examination must be requested of the Graduate School by the student's major adviser using the Request to Schedule Examination form. **The request to schedule must be received by the Graduate School at least two (2) weeks prior to the examination.** Notification by the Graduate School will confirm the scheduled examination. After passing both the qualifying exam and candidacy exam (together referred to as the comprehensive/preliminary exam by the graduate school), the student advances to Ph.D. candidacy.

5.7 Dissertation Defense

The candidate shall pass a final oral examination before being awarded the Ph.D. degree. The supervisory committee shall serve as the examining committee of which the major adviser shall serve as chair. Substitutions must be approved by the Dean of the Graduate School.

The final examination shall cover the dissertation and knowledge fundamental thereto. The candidate shall prepare for each member of the committee a written statement describing the Plan of Study, i.e., a list of courses, instructors, credits, grades, and dates taken. Permission to schedule the final examination must be requested of the Graduate School by the student's major adviser using the

Request to Schedule Examination form. **The request to schedule must be received by the Graduate School at least two (2) weeks prior to the examination.** Notification by the Graduate School will confirm the scheduled examination.

The dissertation in a near final form must be given to the committee members no fewer than seven (7) days prior to the examination. If this seven (7) day stipulation cannot be met, the student must either secure the concurrence of all committee members or reschedule the examination. At the conclusion of the examination, the examining committee shall record, in writing, approval or disapproval. The Report of Final Exam must be filed with the Graduate School within seven (7) days of the exam.

Continuous enrollment is required until all degree requirements are completed, including submitting final copies of the thesis. ***You have 10 years from the day you start to complete your Ph.D. degree.*** To participate in commencement, the student must have passed the final examination seven days prior to the commencement ceremony.

5.8 Publications

All doctoral students are required to have at least one paper accepted for publication in a peer reviewed journal prior to receiving their PhD degree. Acceptable journals are left up to the student's major advisor and supervisory committee. Evidence of publication should be presented to the supervisory committee at the final defense.

5.9 Submission of Final Dissertation

After the final examination, the student incorporates into the dissertation corrections suggested at the oral examination. The student, major adviser, and ECE graduate coordinator then sign the Checklist for Dissertations, Theses, and Papers; and one copy of the dissertation, printed on regular paper, is presented to the Graduate School for approval. This copy must be accompanied by a receipt from the Customer Account Services for the completion package. After approval, 6 final copies of the dissertation, on the required paper are to be presented, unbound, to the Graduate School. Two bound copies of the dissertation go to the university library. Three bound copies are for the student, the student's major adviser, and the ECE department. The sixth copy of the dissertation, accompanied by an additional copy of the title page and an additional copy of the Abstract signed by the major adviser, is sent to Bell & Howell for microfilming.

The student has 1 year from the date of the final examination to deliver the 6 final copies to the Graduate School and complete all other degree requirements. Should the dissertation not be deposited as specified or all other degree requirements not be completed, the student must repeat the final examination. If a period of time two years or greater lapses before the final copies are submitted, the student must reapply to the Graduate School and must register for a minimum of 2 credits. Degree date is based on the date when **final** copies are submitted to the Graduate School.

6. General Graduate Student Policies

6.1 Code of Academic Integrity

Integrity is expected of every student in all academic work. The guiding principle of academic integrity is that a student's submitted work must be the student's own. In particular, conduct prohibited by the NDSU Code of Academic Integrity consists of all forms of academic dishonesty, including, but not limited to:

- Cheating, fabrication, facilitating academic dishonesty, and plagiarism;
- Submitting an item of academic work that has previously been submitted without fair citation of the original work or authorization by the faculty member supervising the work;
- Modifying any academic work to obtain additional credit in the same class unless approved in advance by the faculty member; failure to observe rules of academic integrity established by a faculty member for a particular course; and attempting to commit an act prohibited by this Code.

For example, it is an acceptable practice to work with other students or use on-line resources (such as solutions manuals) to gain understanding and to learn how to solve a type of problem. However, the actual doing of the problems should be your own work. It is not acceptable to have someone else do your work or to copy solutions from an on-line resource. Since this would be copying someone else's work, you must document who did the actual work. This may result in you receiving a zero for this assignment since you did not actually do the work yourself. If you do not document who did the actual work, you are claiming this work as your own – and may face more severe repercussions.

As a second example, it is acceptable to read several references, develop your own opinions, and summarize existing literature (with reference to these sources). It is not acceptable to copy part of a reference and submit it as your own work since i) you are not demonstrating that you understand the material, ii) all sources are biased. You often need to read several sources and develop your own opinion on what is right (even in engineering), and iii) you are taking credit for someone else's work.

Any attempt to commit an act prohibited by these rules shall be subject to sanctions to the same extent as completed acts. All students are also required to abide by the College of Engineering Honor Code (http://www.ndsu.edu/coe/undergraduate_students/honor_code/).

6.2 Credit Load

A full time student is defined as the following:

- 9 Credits: Graduate students with no departmental support (0 hours/week)
- 6 Credits: Graduate assistants in quarter-time or half-time status (10 or 20 hours/week of departmental support)

Graduate assistants wishing to register for more than 15 credits in a regular semester shall secure the approval of their major advisor, academic dean, and the Dean of Graduate School.

6.3 Academic Standing

Every graduate student should strive to keep their GPA above 3.0. The “status” of a student is governed by the GPA, as explained below.

Good Status: The student’s GPA is 3.00 or above. Students in good status are eligible to graduate, eligible for TA, RA, and grader support, and are eligible for tuition waivers (pending support). Any semester a student’s GPA rises to 3.00 or above, the student’s status returns to “Good” regardless of its previous state.

Failure to maintain “**Good**” status may lead to the following consequences.

Academic Warning: The first semester the student’s GPA drops below a 3.00, the student will be placed on Academic Warning. Academic Warning means that the student should be concerned about their grade point, and work especially hard the following semester to bring his/her grade point average above a 3.00. Students on Academic Warning are not eligible to graduate, but are eligible for, but NOT likely to receive, TA, RA, or grader support, and tuition waivers (pending support).

Academic Probation: The second consecutive semester a student’s GPA is below a 3.00, the student will be removed from Academic Warning and placed on Academic Probation. Academic Probation is a warning that the student is very close (one semester away) from removal from the NDSU graduate school. Likewise, that student needs to concentrate on his/her studies to bring their GPA above a 3.00.

Students on Academic Probation are **NOT** eligible for TA, RA, or grader support and cannot receive tuition waivers. While on Academic Probation, the student is expected to dedicate full time on their classes and on bringing their GPA above a 3.00.

Academic Suspension: The third consecutive semester a student’s GPA is below a 3.00, the student will be moved from Academic Probation to Academic Suspension. Students on Academic Suspension are no longer eligible to take classes from NDSU, to receive TA, RA, or grader support, or receive a tuition waiver.

6.4 Termination

Graduate level courses are high-level courses, which assume a solid foundation in the student’s B.S. degree and hard work at the graduate level. In rare situations, it may become evident that a student is not going to complete their graduate program. In these situations, the department may terminate the student’s graduate standing in the ECE department. These situations can include the following:

- Failure to maintain a 3.00 GPA or higher:

The first semester a student’s GPA falls below 3.00, the student will be placed on academic warning. If the student fails to bring his/her GPA to 3.00 or above the following semester, the student’s supervisory committee may decide to terminate the student’s enrollment in the ECE graduate program. In rare situations, the committee may elect to place that student on Academic Probation, allowing that student one more semester to bring his/her GPA to 3.00 or above.

- Failure to make adequate progress in his/her graduate studies:

Each semester, all students are expected to meet with their major advisor and supervisory committee for a progress report. If all members of this committee feel the student is making unacceptable progress and recommend that the student does not continue with their graduate studies, the student's status as a graduate student in the ECE program will be terminated. Students may appeal this termination to the dean of the graduate school.

6.5 Faculty Advisor

Incoming M.S. and Ph.D. students admitted under the preferred avenue (see Section 2.3.B) will be assigned the recommending professor as their major advisor. M.S. students admitted under the secondary avenue (see Section 2.3.B) will have 1 semester to select a mutually agreeable major advisor. Ph.D. students admitted under the secondary avenue (see Section 2.3.B) will have 2 semesters to select a mutually agreeable major advisor. The ECE Graduate Coordinator will be the faculty advisor for all M.E. students. Both M.S. and Ph.D. students are expected to form their supervisory committee by the end of their first year. All graduate students are expected to complete an initial Plan of Study by the end of their first year. The ECE Graduate Coordinator will assist with the admission process, selecting classes for M.E. students and M.S. and Ph.D. students without a major advisor, and pairing an M.S. or Ph.D. student admitted without an advisor, with an appropriate major advisor, based on the student's research interests.

The major advisor will serve as the student's mentor, assist the student in selecting their supervisory committee (for M.S. and Ph.D. students), assist the student in preparing their Plan of Study, and help to ensure that the student is making satisfactory progress toward completion of their degree. For students pursuing an M.S. or Ph.D., the advisor also provides guidance in the selection of a research topic, supervises the research, and serves as the thesis/dissertation director.

6.6 Switching Major Advisors

Your advisor will work with you to select appropriate courses, supervise your research, and mentor you. This often takes a considerable amount of time and funding; and your success directly impacts your major advisor's career, in terms of quality and quantity of research work, which leads to publications, research funding, and graduate students completing their degrees. Therefore, it is strongly discouraged to switch major advisors; doing so requires written consent of both your current advisor and your new proposed advisor. If your current advisor does not consent, you may appeal to the ECE Graduate Coordinator and ECE Department Chair, who will consult with both you and your advisor. Your appeal to switch advisors will only be granted in extenuating circumstances. "The topic is too difficult" or "my advisor expects me to work too much" are NOT valid reasons for switching advisors. If this is the case, you need to work harder to get the job done; graduate school is not supposed to be easy.

6.7 Switching Between Degrees

Refer to Sections 3.1, 4.1, and 5.1.

Any proposed transfer between degree options that requires written approval of the major advisor may be appealed to the ECE Graduate Coordinator and ECE Department Chair if your advisor does not consent. They will consult with both you and your advisor; and your appeal will only be granted in extenuating circumstances.

6.8 Graduate Assistant Expectations

At the beginning of every semester, each TA/grader will sign a contract that clearly states their responsibilities for the semester and their performance criteria for subsequent employment as a TA/grader. These will include their assigned TA/grader duties, their specific research goals for the semester (determined by their major advisor), satisfactory performance in their TA/grader duties, satisfactory performance in their research work (as determined by their major advisor at the end of the semester), and satisfactory performance in their course work. Failure to satisfy any portion of their contract, including TA/grader responsibilities, course work, or research work will be grounds for the ECE department to discontinue TA/grader support for that student.

Typically, departmental support (TA/grader) is provided up to 2 years for M.S. students and up to 4 years for Ph.D. students. RAs are hired by an individual faculty member from his/her personal research funds; hence, continued employment as an RA is at the sole discretion of that faculty member. A student must be registered for course credit during the semester in order to receive an assistantship.

Typical reasons for discontinuing a student's assistantship, and subsequently tuition waiver, include, but are not limited to, the following:

- A student does not abide by the appointment contract
- A student fails to perform tasks as assigned. Lab TAs are required to arrive punctually to the lab and remain in the lab for the entire duration of the class or until all students have completed the lab. Graders are required to return grading assignments to the instructor in a timely manner.
- A student is not making adequate degree progress, including both coursework and research. Performing research is a major graduation requirement for both the M.S. and Ph.D. degrees; therefore, research must be done on a continual basis, not just toward the end of your studies. Students supported as a TA are still expected to make satisfactory progress on their research during their time as a TA.
- A student is not making satisfactory research progress
- A student is placed on Academic Warning or Academic Probation
- A student fails to register for the minimum number of credit hours required
- A student persistently refuses to follow reasonable advice and counsel of faculty in carrying out assistantship obligations
- A student fails to comply with responsibilities as an employee set forth in the *Graduate Bulletin*, department rules and regulations governing assistantships, or the terms of sponsored research agreements that fund the assistantship
- A student's personal conduct is in violation of the NDSU Code of Student Behavior, state or federal law, or general university regulations

7. Research Areas

The ECE department has a broad range of research specialization areas, as listed below, along with the faculty working in each area. Please look at each faculty member's website (<http://www.ndsu.edu/ece/people/faculty/>) for a more in-depth look at their particular areas of expertise.

Biomedical Engineering: Dan Ewert (cardiovascular), Keerthi Nawa, Ivan Lima, Ben Braaten

Computer Architecture: Sudarshan Srinivasan (formal verification), Samee Khan (cloud computing), Scott Smith (asynchronous logic), Na Gong (high-performance multi-core processing)

Cyber Physical and Embedded Systems: Jake Glower (controls), Roger Green (DSP), Samee Khan (cloud, grid, and cluster computing), Scott Smith (wireless sensor networks), Na Gong (mobile computing)

Electromagnetics/Optics: Dave Rogers, Ivan Lima, Ben Braaten

Power/Energy: Rajesh Kavasseri (power systems), Dong Cao (power electronics)

Signal Processing/Communications: Roger Green, Ivan Lima, Sanjay Karmakar

VLSI: Jinhui Wang (3D IC), Debasis Dawn (analog), Scott Smith (digital), Na Gong (memory design)

Electric Materials/Nanotechnology: Danling Wang (sensors), Qifeng Zhang (solar cells and batteries)