

# Department of Electrical Engineering Graduate Studies Handbook

Revised  
June 2023



UNIVERSITY OF  
NOTRE DAME

ELECTRICAL ENGINEERING

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# Department of Electrical Engineering

## Graduate Studies Handbook

In addition to the information in this handbook, students should also refer to the Graduate School Bulletin of Information and other information available on the Graduate School website (<http://graduateschool.nd.edu>), and the Notre Dame guide to student life du Lac (<http://dulac.nd.edu/>).

### Part 1: Academic Policies

#### *I. Enrollment*

Once admitted, all degree and non-degree-seeking graduate students must complete the ND Roll Call process before each semester at the times and locations announced by the University Registrar. Enrollment dates are published in the Graduate School Calendar.

Any admitted student who fails to ND Roll Call for one or more semesters must apply for readmission upon return. (See “Continuous Enrollment,” below.)

##### *I.A Continuous Enrollment*

All students must enroll each semester in the academic year to maintain student status. Continuous enrollment is met normally by enrollment in the University and registration in a graduate-level course relevant to the student’s program. A student who is concurrently pursuing degrees in the Graduate School and in another school in the University meets the continuous enrollment requirement by registering for a course in either program. Any exception to this rule, including a leave of absence, must be approved by the Graduate School. (See “Leave of Absence,” below.)

Degree-seeking students must register for at least nine credit hours per semester during the academic year. Domestic students register for zero credits for the summer session in which they receive their degree to be considered full-time students. International students must register for 1 credit during the summer session of their final semester to be considered full time. Students not in residence during the academic year and taking one credit hour pursuant to continuous enrollment requirements are charged a special registration fee.

A student who fails to enroll for one or more semesters must apply for readmission upon return. Continuing degree-seeking students (i.e., degree students who are eligible to continue their studies in the fall semester) may have access to university facilities and services from May through August without registering and enrolling for academic credit in the Summer Session.

##### *I.B. Leave of Absence*

For exceptional reasons and on the recommendation of the department, a student in good academic standing may request a leave of absence for a maximum of two consecutive semesters. A request for a leave of absence must be made before the semester in which the leave is taken, and all leaves of absence must be approved by the Graduate School. If, for some urgent reason, a student is allowed to leave the University after the beginning of the

semester, the withdrawal procedure below must be followed. If at the end of the leave of absence period the student does not return, the student is considered terminated. Application for readmission is required if the student wishes to return.

### ***I.C. Withdrawal from the Program***

To withdraw from the University before the end of the semester, a student must inform the department and the Graduate School as well as complete the notice of withdrawal in the Office of the Registrar, 105 Main Building.

Upon approval of the withdrawal, the University enters a grade of “W” for each course in which the student was registered. If a student drops out of the University without following the procedure described above, a grade of “F” is recorded for each course.

The credit for any course or examination will be forfeited if the student interrupts his or her program of study for five years or more.

The University reserves the right to require the withdrawal of any student when academic performance, health status or general conduct may be judged clearly detrimental to the best interests of either the student or the University community.

In the case of a medical leave of absence, clearance from the University Health Center is required prior to readmission.

Students who wish to temporarily interrupt their program for medical reasons must apply to the Graduate School for a medical separation. Details are given in the Graduate School Bulletin of Information.

## ***II. Academic Regulations***

### ***II.A. Full-time and Part-time Students***

A full-time student is one who is working full time towards his or her degree objective. This normally means that a full-time student is one who (1) registers for nine or more credit hours of required course work per semester in the academic year or six or more credit hours in the Summer Session or (2) is engaged in non-resident dissertation research with an advisor and is registered for a minimum of one credit hour. (See “Continuous Enrollment.”)

A part-time student is any enrolled graduate student who does not fall within either of the preceding categories. For loan purposes, a half-time student is a part-time student who registers for at least six credit hours per semester in the academic year or three credit hours in the Summer Session.

All degree-seeking students are expected to maintain full-time status and to devote full time to graduate study. No degree-seeking student may hold a job, on or off campus, without the express permission of his or her department and the Graduate School.

## ***II.B. Registration Limitations***

During the academic year, a graduate student may not register for more than 15 credit hours of graduate courses in any semester. In the Summer Session, a graduate student may not register for more than 10 credit hours.

## ***II.C. Changes in Student Class Schedules***

A student may add courses only during the first six class days of the semester. Students may add courses after this time only on the recommendation of the department and with approval of the Graduate School.

A student may drop courses during the first six class days of the semester. To drop a course after this period and up to the midsemester point (see the Graduate School Calendar for the exact date), a student must have the approval of the student's advisor and the Graduate School. A course may be dropped after the midsemester point only in cases of serious physical or mental illness. Courses dropped after this date will be posted on the student's permanent record with the grade of "W."

A course taken for credit can be changed to an audit course after the midsemester point only in cases of serious physical or mental illness.

## ***II.D. Course Numbers***

No graduate credit is allowed for courses below the 40000 level. The advanced undergraduate courses numbered 40000 through 49999 may, with the approval of the department chair and the Graduate School, be taken to satisfy up to six credit hours of graduate degree requirements for an MS and ten credit hours for the PhD.

Courses numbered 60000 through 69999 are first-level graduate courses into which qualified advanced undergraduates may be admitted with the permission of the instructor and the approval of the chair. Courses numbered 70000 and above are advanced graduate courses open only to those who have completed the undergraduate and graduate prerequisites.

## ***II.E. Graduate Grades***

Listed below are graduate grades and the corresponding number of quality points per credit hour.

A	4
A-	3.667
B+	3.333
B	3
B-	2.667
C+	2.333
C	2
C-	1.667
D	1
F	0
I	0 (Until Incomplete is removed)

NR	Not reported
S	0 Satisfactory
U	0 Unsatisfactory
V	0 Auditor (graduate students only)
W	0 Discontinued with permission

Quality point values are used to compute the student's G.P.A. The G.P.A. is the ratio of accumulated earned quality points to the accumulated earned semester credit hours. G.P.A. computation takes into account only those grades earned in Notre Dame graduate courses by students with graduate status at Notre Dame. For courses taken in a department or college in the University but outside the Graduate School, or taken outside the University, the grade will not be included in the G.P.A. computation.

Courses in which the student receives a grade below C cannot be used to satisfy any graduate degree requirements, but they are still included in the computation of G.P.A.

A student receives the temporary grade of "I" ("Incomplete") when, for acceptable reasons, he or she has not completed the requirements for a 60000 or higher-level graduate course within the semester or summer session. No grade of "I" can be given for courses below the 60000 level or to graduating students in the final semester or final summer session of a terminal degree program.

A grade of "Incomplete" (I) is given only in exceptional circumstances and only for compelling reasons. When a student receives a grade of "I" he or she has 30 calendar days from when grades were due (for the semester in which the "I" was given) to complete the coursework. The instructor of record then has 14 calendar days to report the grade. If the coursework is not completed by this date, the grade of "I" will be changed permanently to a grade of "F". Extensions for Incompletes require formal approval from the associate dean for academic affairs in the Graduate School. The associate dean reserves the right to seek appropriate documentation from the Office of Disability Services if a request for an extension beyond the usual 30 calendar days is made for mental or physical health reasons.

The University temporarily computes an "I" as the equivalent of an "F" in calculating the G.P.A. When the student fulfills the above requirements, the "I" is replaced by the new grade. Should the student not complete the course work as required, the "I" is converted to an "F".

The department and the Graduate School will review a student who receives more than one "I" in a semester or an "I" in two or more consecutive semesters, to determine his or her eligibility for continued support and enrollment.

The grades of "S" and "U" are used in courses without semester credit hours, as well as in research courses, departmental seminars, colloquia, workshops, directed studies, field education, and skills courses. These courses, if given the grade of "S", do figure in a student's earned semester credit-hour total but do not figure in the computation of the G.P.A. A grade of "U" will not count toward the student's earned semester credit-hour total, nor will it figure in the computation of the G.P.A.

The grade of "V" has neither quality-point nor credit-hour value. It is the only grade available to the registered auditor who requests at the beginning of the semester that it be

made part of his or her permanent record and who attends the course throughout the entire semester. The grade of “V” cannot be changed to a credit-earning grade.

The grade of “W” is given for a course that a student is allowed to drop after the midsemester point.

### ***II.F. Examinations***

Unexcused absence from a scheduled final examination results in an “F.” An absence excused in advance results in an “I” (incomplete).

### ***II.G. Academic Good Standing***

Continuation in a graduate degree program, admission to degree candidacy, and graduation require that the student be in academic good standing. This is defined as maintenance of a cumulative G.P.A. of at least a 3.0 (B). A student may be dismissed from the department or program if the G.P.A. in any one semester is below 2.5 or if the cumulative G.P.A. is below 3.0 for two consecutive semesters.

A student who’s cumulative G.P.A. drops below 3.0 is not allowed to register for thesis or dissertation research credits until this deficiency is removed. Also, a student whose cumulative G.P.A. is below 3.0 is not allowed to defend his or her thesis. A student must be in academic good standing to be eligible for new or continued financial support.

### ***II.H. Director of Graduate Studies***

The Director of Graduate Studies advises all new graduate students concerning the various aspects of graduate study in the Department of Electrical Engineering. The Director of Graduate Studies also takes care of all procedural aspects of a student's program and is an ex-officio member of the Graduate Committee.

### ***II.I. Faculty Advisor***

Upon entry into our graduate program, each student will be assigned a temporary academic advisor from among the faculty in the student’s technical area. This temporary advisor will assist the student during his/her first year in setting up a course plan and identifying research interests. Normally, graduate students will be required to identify a permanent faculty advisor by March 1; it will be the responsibility of this faculty advisor to advise the student on academic matters, direct his/her research, and support the student financially during the student’s graduate program. Failure to identify an academic advisor who can take on these responsibilities may be regarded as failure to make adequate progress towards the degree (see II.M. below) and be cause for a student to be terminated from the program.

If a student decides that he/she would like to change academic advisors after the first year, they are free to do so. However, it is the student’s responsibility to make sure that the proposed new advisor is amenable to the change and is capable of supporting the student financially.



### ***II.J. Major Area***

The course work and research in Electrical Engineering can be divided into two broad areas:

- (ECS) Electronic Circuits and Systems: communication systems, control systems, signals, and image processing.
- (EMD) Electronic Materials and Devices: solid-state materials and devices, including optoelectronics.

Normally each student will select one of these areas as his/her major area of concentration.

### ***II.K. Qualifying Examination***

The Qualifying Examination must be taken by all full-time graduate students at the end of their first full year of graduate study. The exam takes place in August for fall admits and in December for spring admits. A student can take the PhD qualifying exam only if he / she has passed the MS comprehensive exam.

The purpose of this examination is to determine the student's potential and readiness to complete the Ph.D. programs. For fall admits, the student must choose an advisor by March 1, and he/she works on a research project with this advisor through the summer. At the end of the summer the student prepares a four-page written report and gives a 25-minute presentation of the research to a committee composed of three faculty members. The presentation is followed by questions, centered on the research, from the committee.

The two parts of the Qualifying Examination are evaluated by the faculty as a whole, and there are two possible outcomes:

- Pass
- Not pass

The faculty may recommend that students who have not passed the exam either leave the program, or retake the exam. These recommendations are passed to the Graduate Committee to aid in its determination of the student's future status. Results of the examination are communicated to the student by a letter from the department. A student who has been asked to leave the program may appeal this decision to the graduate committee. The exam can be retaken no more than once. The exam must be completed before the beginning of the student's fourth semester in order for the student to receive continued financial support from the department.

### ***II.L. Visitors at Oral Examinations***

All oral examinations in the department are open to all members of the Electrical Engineering faculty. Faculty members who are not part of the examining board are free to ask questions of the candidate but do not vote in any recommendations arising from the examination.

### ***II.M. Progress Toward a Degree***

A student who commences a degree program in electrical engineering is expected to

demonstrate continuous progress toward that degree. This regulation is in addition to the constraints imposed by the Graduate School. A student's advisor will monitor his or her continuous progress.

### ***II.N. Continuing Status***

Students who are admitted to the graduate program are assured of at least two semesters of graduate student status. During that time, they will take the Qualifying Examination. If they do not demonstrate graduate level capability on that examination, they must meet with the Graduate Committee to discuss the continuation of their graduate student status. Similarly, students who do not finish their M.S. program within four semesters must also meet with the Graduate Committee to discuss continuation.

The Graduate Committee may make recommendations to the Department Chairman and the Graduate School concerning a student's status and financial support. These recommendations are based on a student's course grades, graduate examinations, and other factors. The department will not continue financial support for any student not making satisfactory progress towards a degree.

### ***III. Financial Support***

#### ***Graduate School Financial Support Policy***

Full-time, degree-seeking graduate students in good academic standing may be eligible for financial support supplied by the University.

Financial support from the university comes in two broad classes:

- Graduate assistantships and university fellowships. This support comes from the Graduate School but is allocated by the department. Graduate students supported by a graduate assistantship should expect to spend at least 12 hours a week assisting in teaching courses. This usually takes the form of running laboratory sections, recitation sections, and/or grading. Graduate students supported by university fellowships may or may not be required to carry out teaching duties, depending on the specifics of the fellowship.
- Research assistantships. These are a form of support provided by individual faculty members who obtain grants from external agencies (e.g., National Science Foundation or NASA) to carry out research projects. Students are expected to work with the faculty member in performing research as part of their training. Research assistants are normally expected to be working on their research projects year-round. Vacation times need to be coordinated with the research director.

Graduate assistants, research assistants, and fellows who receive a full stipend should not be employed elsewhere on campus. (Exceptions must be approved by the Graduate School.) For administrative and visa purposes, these positions are considered to be part-time at 18 hours per week.

Graduate assistants and research assistants are restricted to a maximum load of 15 credit hours of course work per semester.

New graduate students admitted with support (either GA, RA, or a fellowship) can be

assured of support for two semesters. Support in the summer must normally come from a research assistantship in association with a faculty member. It is the student's responsibility to make such arrangements with a faculty member able to provide support.

The Qualifying Examination should be passed before the beginning of the student's fourth semester in order for the student to receive continued financial support from the department.

A graduate student cannot receive more than eight years of financial support from the Graduate School or from funds allotted by the Graduate School to departments.

#### ***Compliance with Federal Aid Regulations***

Recipients of federal financial aid must comply with the standards of progress set by their respective departments for their particular programs of study. When failure to maintain progress results in the possible loss of financial aid eligibility, the Office of Financial Aid will notify students in writing. Appeals indicating any mitigating circumstances must be made in writing to the associate director of financial aid.

### ***IV. Academic Integrity***

#### ***Graduate School Policy***

Integrity in scholarship and research is an essential characteristic of our academic life and social structure in the university. Any activity that compromises the pursuit of truth and the advancement of knowledge besmirches the intellectual effort and may undermine confidence in the academic enterprise. A commitment to honesty is expected in all academic endeavors, and this should be continuously emphasized to students, research assistants, associates, and colleagues by mentors and academic leaders.

The procedures for ensuring academic integrity in the Graduate School are distinct from those in the Undergraduate Code of Honor. Details are given in the Graduate School Bulletin of Information.

### ***V. Policies on Harassment and Other Aspects of Student Life***

#### ***V.A Graduate School Policy on Harassment***

Sexual and discriminatory harassment are prohibited by the university. Definitions and policies regarding sexual harassment, discriminatory harassment and other aspects of student life and behavior are described in du Lac, which is the University's description of student life policies and procedures. Students in the Graduate School must abide by those portions of du Lac that explicitly refer to graduate students or to the Graduate School. Copies of du Lac are available online at <http://dulac.nd.edu>.

#### ***V.B. Departmental Grievance and Appeal Procedures***

One of the realities of graduate experience is that not everyone who begins a doctorate completes it. It is important that we have fair processes that protect both students and programs in cases of academic integrity and when students must be dismissed. The purpose

of this document is to provide programs with a model that can be adapted in the program's student handbook that will ensure an equitable process. This process is restricted to academic issues; issues of personal misconduct are handled by Student Affairs. For issues of sexual or discriminatory harassment or disability-related grievances please consult du Lac: A Guide to Student Life at <http://dulac.nd.edu>.

An appeal is a two-step process; the first is through the program. If the student does not agree with the program's decision, she or he may appeal to the Dean of the Graduate School, who makes the final determination. The Graduate School's grievance process can be found at: <http://graduateschool.nd.edu>.

### ***V.C. Violations of Academic Integrity***

A commitment to honesty is expected in all academic endeavors, and this should be continuously emphasized to students, research assistants, associates, and colleagues by mentors and academic leaders.

Violations of academic integrity may occur in classroom work and related academic functions or in research/scholarship endeavors. Classroom-type misconduct includes the use of information obtained from another student's paper during an examination, plagiarism, submission of work written by someone else, falsification of data, etc. Violation of integrity in research/scholarship is deliberate fabrication, falsification, or plagiarism in proposing, performing, or reporting research or other deliberate misrepresentation in proposing, conducting, reporting, or reviewing research. Misconduct does not include errors of judgment, errors in recording, selection, or analysis of data, differences in opinions involving interpretation, or conduct unrelated to the research process. Misconduct includes practices that materially and adversely affect the integrity of scholarship and research.

A violation of academic integrity is a serious accusation. The punishment of a student who is found to be in violation should be determined by the graduate committee of the Department of Electrical Engineering. If a student is charged with a violation of academic integrity, he or she may appeal the program's decision.

### ***V.D. Academic Integrity Appeal Process (as reflected in the Graduate Bulletin)***

Any person who has reason to believe that a violation of this policy has occurred shall discuss it on a confidential basis with the EE department chair. If a perceived conflict of interest exists between the chair/director and the accused, the appropriate associate dean of the College of Engineering shall be notified of the charge.

The chair shall evaluate the allegation promptly. If it is determined that there is no substantial basis for the charge, then the matter may be dismissed with the fact of dismissal being made known to the complainant and to the accused if he or she is aware of the accusation. A written summary of charges, findings, and actions shall be forwarded to the dean of the Graduate School as a matter of documentation. Otherwise, the chair will select an impartial panel consisting of three members, one of whom may be a graduate student, to investigate the matter.

The chair will inform the accused of the charges. The panel will determine initially whether to proceed directly to a hearing to further investigate the case, or to dismiss the charges. If

the panel decides to proceed directly to a hearing, the hearing will be held within 10 business days of the original notification. If the panel decides that further investigation is necessary, it shall immediately notify the chair. If it decides that a hearing is not warranted, all information gathered for this investigation will be destroyed. The utmost care will be taken to minimize any negative consequence to the accused.

The accused party must be given the opportunity to respond to any and all allegations and supporting evidence at the hearing. The response will be made to the appointed panel. The panel will make a final judgment, recommend appropriate disciplinary action, and report to the chair in writing. The report will include all of the pertinent documentation and will be presented within 30 days after meeting with the accused. Copies of the report are to be made available to the accused, the chair, and the dean of the Graduate School. If a violation is judged to have occurred, this might be grounds for dismissal from the University; research/scholarship violations might be reported to the sponsor of the research effort (e.g., NSF, NIH, DOD, etc.), if appropriate.

### ***V.E. Dismissal***

Students may be dismissed at either an exam gateway—e.g., the qualifying, candidacy, or defense examinations—or through poor performance. It is critical for the program to communicate the standards to students in advance and in writing.

If a student fails to pass an exam, the Director of Graduate Studies will write the student informing him or her of the failure and provide information about any recourse of action that the student might have. If a student is performing poorly, the advisor or DGS should provide the student with a written notice about the poor performance; indicate the expectations necessary to remain in the program, and give the student a specific time when he or she will be re-evaluated.

Dismissal should not be a surprise to a student. There should be clear records of the expectations and performance.

### ***V.F. Dismissal Appeal Process***

If a student is dismissed for academic reasons, he or she may appeal the program's decision. Complaints must be initiated by a written statement from the student to the chair of the EE Department within 10 business days from the time when the student is informed of dismissal. To hear the appeal, the department chair appoints an *ad hoc* committee composed of three members: him/herself and at least two faculty members unconnected factually with the case or the reasons for the appeal. A graduate student can replace one of the two faculty members on the committee if the nature of the appeal warrants such. If the department chair has been involved in the case, the appropriate associate dean of the College of Engineering should appoint the committee and designate the person to serve as its chair. The student's statement should indicate details on the nature of the problem, the date(s) the problem occurred, the grounds upon which the appeal is based, background information that the student considers important and the relief requested.

The appeals committee will promptly and thoroughly investigate the appeal to determine whether the relief requested is warranted. The investigation may include interviews and/or written statements from the student, any student witnesses, faculty or staff members who

may be able to provide pertinent information about the facts, as well as a review of any pertinent documents.

In most situations, the appeals committee will complete the investigation in 30 business days. There may be some reports that cannot be investigated within 30 business days. In such cases, the chair of the appeals committee will communicate to the student that the investigation is going to take longer than 30 business days and will also include a statement indicating when the committee anticipates completing the investigation. The department chair will notify the student in writing of his/her decision. If the chair has been involved in the case, the decision will be made by the designated chair of the *ad hoc* committee.

### ***V.G Graduate Student Vacation Policy***

All Ph.D. graduate students are eligible to take two weeks (10 vacation days) of vacation during each twelve-month period in addition to the following University holidays: Martin Luther King Jr. Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and the day after Thanksgiving, Christmas through New Year Celebration. Weekends and the weeks of Fall break and Spring break are not University holidays. Appropriate vacation days should be worked out well in advance with the student's advisor and supervising instructor (if serving as a TA) to ensure they do not conflict with other responsibilities. Students requesting vacation time must first obtain a *Vacation Request Form* from the Department's Graduate Administrator (DGA), fill out the form, obtain required signatures, and return to the DGA.

## **Part 2: Degree Programs**

### ***I. General Requirements***

These requirements are common to all degrees offered by the Department of Electrical Engineering.

#### ***I.A. Credit Hours***

Semester Credit hours for courses taken at Notre Dame are classified as follows. *Earned credit hours* refers to credit hours awarded for completion of a course at the University. These earned credit hours are classified as either *lecture (L)*, *research (R)*, or *teaching (T)* credit hours. *Lecture (L)* credit hours are for any lecture course providing a *letter grade*. *Research (R)* credit hours are for the S/U graded courses of Special Studies (EE 67598), Thesis Direction (EE 68599), or Research and Dissertation (EE 88699). *Teaching (T)* credit hours are for the S/U graded course of Grad Teaching Assist Training (EE 88500).

#### ***I.B. Foreign Language Requirement***

The Department of Electrical Engineering has no foreign language requirement.

#### ***I.C. Transfer Credits***

The department may accept course work completed at another accredited university toward

meeting its degree requirements. A student may transfer credits earned at another accredited university only if:

1. the student is in degree status at Notre Dame;
2. the courses taken are graduate courses appropriate to the Notre Dame graduate program and the student had graduate student status when he or she took these courses;
3. the courses were completed within a five-year period prior to admission to a graduate degree program at Notre Dame or while enrolled in a graduate degree program at Notre Dame;
4. grades of “B” (3.0 on 4.0 scale) or better were achieved; and
5. the transfer is recommended by the student’s advisor, approved by the Graduate Committee, and finally approved by the Graduate School.

These five requirements also apply to the transfer of credits earned in another program at Notre Dame.

The student must petition the Graduate Committee for transfer of credits. The department considers a request for credit transfer only after a student has completed one year in a Notre Dame graduate degree program and before the semester in which the graduate degree is conferred. The university of origin must submit two transcripts directly to the Notre Dame Graduate School. Credits not earned on the semester system, such as trimester and quarter-hour credits, will be transferred on a pro- rata basis.

A student transferring from an unfinished master’s program may not transfer more than six (6) semester lecture course credit hours into a Notre Dame master’s or Ph.D. program. If the student has completed a master’s degree, he or she may transfer up to six (6) lecture credit hours to a Notre Dame master’s program and up to fifteen (15) lecture credit hours to a Notre Dame Ph.D. program.

Occasionally, a student may need to do dissertation research at another institution. Normally, the student would register for the appropriate number of credit hours of research at Notre Dame. If the student does not enroll at Notre Dame and expects to count research hours earned elsewhere toward the Notre Dame degree, the student must have the approval of the department and the Graduate School in advance. The university requires similar prior approval for formal courses taken elsewhere and applied to the degree program.

No grades of transferred courses are included in the student’s G.P.A.

## ***II. Requirements for the Research Master of Science Degree in Electrical Engineering***

### ***II.A. Course-work Requirement***

The M.S. program requires a minimum of thirty (30) earned semester credit hours, of which a minimum of eighteen (18) credit hours must be lecture credit hours (letter graded courses, not including seminars), and a minimum of six (6) earned credit hours must be research credit hours in Thesis Direction (EE 68599). Up to nine (9) semester hours of lecture credit may be taken from departments other than the Department of Electrical Engineering, but

should be approved by the student's advisor. The course work should be designed to prepare the student adequately for work in the major area of specialization. Advanced undergraduate courses, numbered 40000 to 49999, may be taken for up to six (6) lecture credit hours.

### ***II.B. Residency***

The minimum residency requirement for the master's degree is registration in full-time status for one semester during the academic year.

### ***II.C. Degree Eligibility***

Failure to complete all requirements for the master's degree within five years results in forfeiture of degree eligibility. A master's program that is pursued during the summer and the academic year must also be completed within five years. A student attending Summer Session only must complete all requirements within seven years.

### ***II.D. Advisors and Thesis Directors***

Every graduate student must have a faculty advisor. The advisor will assist the student in choosing courses and in choosing a thesis topic; the advisor is also responsible for financially supporting the student. If a student wishes to change advisors, it is permitted with the proviso that the proposed new advisor must agree to the change and be able to meet all responsibilities with respect to the student. Changing advisors more than once is discouraged.

Any student who is working on an MS thesis in the Electrical Engineering Department must have either a thesis advisor or co-advisor who is a regular faculty member in the department. If two or more people share the responsibility of thesis advisor, they shall each be known as thesis co-advisors and each shall sign the final thesis document. If a thesis involves work outside the department, it must be directed, at least in part, by a faculty member from the department.

### ***II.E. Admission to Candidacy***

To qualify for admission to M.S. candidacy, a student must be in a master's degree program. He or she must have been enrolled in the program without interruption and maintained a minimum cumulative G.P.A. of 3.0 in approved course work. A student who seeks admission to candidacy in a research master's program must also demonstrate research capability.

Admission to candidacy is a prerequisite to receiving any graduate degree. It is the student's responsibility to apply for admission by signing and submitting the appropriate form to the Graduate School office through the graduate coordinator. The applicable deadline is published in the Graduate School Calendar.

### ***II.F. Master's Comprehensive Examination***

A student must pass the M.S. comprehensive exam to obtain the Master's Degree. The exam consists of final exams of four courses out of a list of the courses as approved by the **department's Director of Graduate Studies**. The student will indicate the courses for



which he / she wants to have the finals considered for the qualifier by the last class day of the corresponding semester. The performance of the student is evaluated by the faculty as a whole and the outcome determined. The exam must be finished within the first two semesters, unless the department grants a waiver. A student who fails the exam can appeal to the graduate committee along with his / her advisor.

### ***II.G. Thesis Requirement***

To receive a research M.S.E.E., students must write a thesis under the guidance of a faculty advisor and register for a total of at least six (6) credit hours of thesis research (EE 68599). In addition, no later than one semester before he/she expects to graduate, the student must submit a Thesis Advisor Certification to the Graduate Committee. The thesis advisor and the student are then responsible for choosing an Oral Thesis Defense examining board, which is comprised of the thesis advisor plus two readers.

Readers are appointed from among the regular faculty of the student's department. The appointment of a reader from outside the student's department must have the Graduate School's prior approval. The thesis director may not be one of the official readers.

The thesis should follow the guidelines in the Graduate School's Guide for Formatting and Submitting Dissertations and Theses, available at the Graduate School office. The thesis director indicates final approval of the thesis and its readiness for the readers by signing the thesis.

The candidate then delivers signed copies of the completed thesis to the two official readers appointed by the department. Each reader must unconditionally approve the thesis and the department should promptly report the results to the Graduate School.

Upon acceptance of the thesis by the Oral Thesis Defense examining board, the student must successfully pass the Oral Thesis Defense. This examination is conducted as a thesis defense and may include general questions on the candidate's major area.

After successfully passing the Oral Thesis Defense, the candidate should deliver two clean copies signed by the thesis director to the Graduate School office on or before the date specified in the Graduate School Calendar. There it will be verified for compliance with the style manual. An additional copy should be given to the department for binding.

Students should be cognizant of deadlines for graduation established by the Graduate School and the department.

Should a student and advisor decide to microfilm a thesis, information concerning the University Microfilms International Master's Publishing Program may be obtained from the Graduate School office.

## ***III. Requirements for the Non-research Master of Science Degree in Electrical Engineering***

### ***III.A. Course-work Requirement***

The non-research M.S. program requires a minimum of thirty (30) earned credit hours. A minimum of twenty-seven (27) of these earned credit hours must be lecture course credit hours (letter graded courses, not including seminars). No more than nine (9) hours of lecture

course credit may be taken from departments other than the Department of Electrical Engineering. The course work should be designed to prepare the student adequately for work in the major area of specialization. Advanced undergraduate courses, numbered 40000 to 49999, may be taken for up to six (6) lecture credit hours.

### ***III.B. Residency***

The minimum residency requirement for the master's degree is registration in full-time status for one semester during the academic year.

### ***III.C. Degree Eligibility***

Failure to complete all requirements for the master's degree within five years results in forfeiture of degree eligibility. A master's program that is pursued during the summer and the academic year must also be completed within five years. A student attending Summer Session only must complete all requirements within seven years.

### ***III.D. Advisors***

Every graduate student must have a faculty advisor. The advisor will assist the student in choosing courses and meeting department requirements.

### ***III.E. Admission to Candidacy***

To qualify for admission to candidacy, a student must be in a master's degree program. He or she must have been enrolled in the program without interruption and maintained a minimum cumulative G.P.A. of 3.0 in approved course work.

Admission to candidacy is a prerequisite to receiving any graduate degree. It is the student's responsibility to apply for admission by signing and submitting the appropriate form to the Graduate School office through the graduate coordinator. The applicable deadline is published in the Graduate School Calendar.

### ***III.F. Master's Comprehensive Exam***

A student must pass the M.S. comprehensive exam to obtain the Master's Degree. The exam consists of final exams of four courses out of a list of the courses as approved by the **department's Director of Graduate Studies**. The student will indicate the courses for which he / she wants to have the finals considered for the qualifier by the last class day of the corresponding semester. The performance of the student is evaluated by the faculty as a whole and the outcome determined. The exam must be finished within the first two semesters, unless the department grants a waiver. A student who fails the exam can appeal to the graduate committee along with his / her advisor.

## ***IV. Doctor of Philosophy Degree Requirements***

The Degree of Doctor of Philosophy is conferred only in recognition of proficiency and high attainment in advanced scholastic endeavor and independent investigation. It is not conferred merely for the completion of a required number of courses but for demonstrated independence, initiative, and exceptional ability in study and thought.

#### ***IV.A. Course-work Requirement***

The Ph.D. degree requires a minimum of sixty (60) earned semester credit hours. A minimum of twenty-seven (27) of these earned credit hours must be lecture course credit hours (letter graded courses, not including seminars). A minimum of twenty-seven (27) of these earned credit hours must be research credit hours from the S/U graded courses Special Studies (EE 67598), Thesis Direction (EE 68599), or Research and Dissertation (EE 88699). No more than six (6) lecture credit hours from EE courses numbered 40000 to 49999 may count toward degree credit. Students are encouraged to pursue course work outside the department whenever such study supports their program in the major area.

#### ***IV.B. Teaching Assistant (TA) Requirement***

The Ph.D. degree requires a minimum of six (6) teaching earned credit hours from the S/U graded course Grad Teaching Assist Training (EE 88500). Each teaching course credit corresponds to an average of 4 hours per week of teaching assistant (TA) duties under the supervision of a course instructor.

#### ***IV.C. Residency***

The minimum residency requirement for the Ph.D. degree is three years in resident study and full-time status for four consecutive semesters.

#### ***IV.D. Degree Eligibility***

The student must fulfill all doctoral requirements, including the dissertation and its defense, within eight years from the time of matriculation. Failure to complete any of the Graduate School or departmental requirements within the prescribed period results in forfeiture of degree eligibility.

#### ***IV.E. Advisors and Dissertation Directors***

Any student who is working on a doctoral degree in the Electrical Engineering Department must have either a Dissertation Advisor or a Dissertation Co-Advisor who is a regular faculty member in the department. If two or more people share the responsibility of Dissertation Advisor, they shall each be known as Dissertation Co-advisors and each shall sign the final Dissertation document. Thus, if a dissertation involves work outside of the department, it must be directed, at least in part, by a faculty member from the Department of Electrical Engineering.

#### ***IV.F. Examination Requirements***

Each Ph.D. student must pass three examinations to fulfill the department requirements for graduation -- the Qualifying Examination, the Oral Candidacy Examination, and the Dissertation Defense. The Qualifying Examination is used to determine whether the student has the potential and required background for obtaining the Ph.D. Degree. The Oral Candidacy Examination is administered to determine whether the student has depth in his research area and has identified a viable dissertation topic. At the Dissertation Defense, the

student defends his or her dissertation before an oral examining board.

### ***Qualifying Examination***

The student must demonstrate Ph.D. capability on the Qualifying Examination described in Section II.K.

### ***Oral Candidacy Examination***

In addition to passing the Qualifying Examination, a student seeking the Ph.D. degree must pass the Oral Candidacy Examination to become a Ph.D. Candidate. The purpose of this examination is to determine if the student has depth in his/her major area, has identified a viable dissertation topic, performed the appropriate literature search, and proposed a reasonable set of research goals. Typically, this examination is taken during the fifth semester, after the completion of **30 lecture course credits and 12 research course credits**. It *must* be taken before the end of the eighth semester, or the student will no longer be eligible for any kind of support from the Graduate School – including tuition waivers.

The student must prepare a written Dissertation Proposal that summarizes the background of the research topic together with the proposed plan of investigation. This proposal is distributed, at least three weeks prior to the examination, to the members serving on the Oral Candidacy examining board.

The exam committee consists of at least three voting members in addition to the advisor and any co-advisors. Normally, this board has the same membership as the student's dissertation committee. Board members are chosen from the faculty of the Electrical Engineering department by the student. Committee members outside of the department must be approved by the graduate committee. The student writes a letter (signed by the faculty advisor) to the graduate committee, accompanied by a CV of the prospective member. The department gives a blanket approval to faculty from chemistry, physics, and computer science & engineering since there is so much collaboration between the departments. The student's advisor acts as the chair of the exam.

Please see the Graduate Coordinator for instructions and to reserve a time and place for your Oral Candidacy Examination at least one week prior to the exam. It is imperative that the guideline is followed in a timely fashion and that the committee members have nominally one month and no less than three weeks to review the proposal.

At the Oral Candidacy Examination, the student will begin the proceedings with a presentation outlining the contents of the dissertation proposal. Members of the examining board will then question the student on the contents of his/her presentation and related areas.

After completion of the examination, the chair calls for a discussion followed by a vote of the examiners. A passing vote means that the examining board feels the student has acquired the proper background and that it approves the Dissertation Proposal. A vote with no more than one negative vote is required to pass. The chair

of the exam must submit the reporting form on the results, which is required within five business days. The Graduate School officially notifies the student of the results.

In case of failure of the doctoral candidacy examination, the department chair, on the recommendation of a majority of the examiners, may authorize a retake of the examination. An authorization for retake must be approved by the Graduate School. A second failure results in forfeiture of degree eligibility and is recorded on the candidate's permanent record.

#### ***IV.G. Admission to Candidacy***

Admission to candidacy is a prerequisite to receiving any graduate degree. To qualify for admission to doctoral candidacy, a student must:

1. be in a doctoral program;
2. have been continuously enrolled in the program for four consecutive semesters;
3. complete the departmental course work requirement with a cumulative average of 3.0 or better. 36 course credits *must* be completed before taking the candidacy examination;
4. pass the written and oral parts of the doctoral candidacy examination (passing the written part is equivalent to passing the qualifying examination.)

The Graduate Coordinator will file for candidacy admission by submitting the appropriate form to the Graduate School office through the Department Chair or the Director of Graduate Studies. Consult the Graduate School Calendar for the appropriate deadlines.

#### ***IV.H. The Doctoral Dissertation***

The dissertation is prepared under the guidance of the student's dissertation advisor. The department chair or director of graduate studies will appoint a dissertation committee consisting of the dissertation director and any co-advisors and at least three official readers. Normally, the committee is drawn from the membership of the student's oral candidacy board. The readers should come from among those participating in the Oral Candidacy Examination. It is expected that they will be consulted frequently by the student throughout the research period either individually or as a group.

The candidate schedules the defense 5 weeks prior to the defense date and delivers typed copies of the finished dissertation, signed by the director, to the readers at least three weeks before the dissertation defense. The dissertation should follow the guidelines in the Graduate School's Guide for Formatting and Submitting Dissertations and Theses, even if the candidate has previously published the substance of the dissertation in scholarly journals. The Guide is available on the Graduate School website.

Readers normally have three weeks to read the dissertation, decide whether it is ready to be defended, and so indicate on the Reader's Report to the Graduate School due 3 business days prior to the defense. Reader approval of the dissertation for defense does not imply reader agreement or support; it implies reader acknowledgment that the dissertation is an academically sound and defensible scholarly product. Only a dissertation that has been unanimously approved for defense by the readers may be defended.

See the Graduate Coordinator for instructions and to reserve a time and place for your Doctoral Dissertation. It is imperative that the completed Reader's Report on Doctoral Dissertation forms are received in the Graduate School no later than 3 business days prior to the examination.

Even though the dissertation has been approved for defense, revisions may be required. If defects in the dissertation come to light at the defense, the candidate may be asked to revise the dissertation before it is accepted by the Graduate School and the degree is conferred. In that case, it will be the responsibility of the dissertation director, or such person as the committee may appoint, to report to the Graduate School that such revisions have been completed satisfactorily.

#### ***IV.I. Defense of Dissertation***

The defense is chaired by the student's advisor. The defense board consists of the dissertation committee. A vote with no more than one negative vote is required to pass. A reporting form on the results is required within 5 business days.

#### ***IV.J. Final Submission of Dissertation***

To receive the degree at the next commencement, the doctoral candidate who has successfully defended his or her dissertation must submit it to the Graduate School on or before the deadline published in the Graduate School calendar. Candidates should be cognizant of deadlines for graduation established by the Graduate School and the department.

When the final dissertation is given to the readers, the candidate should also give a complete copy to the Graduate School, where it will be reviewed for compliance with the style manual. This copy may be submitted electronically as a PDF or delivered as a printed document.

After successfully defending the dissertation and making any necessary changes, the candidate must present the document to the Graduate School for final approval and submission. The student must submit the dissertation electronically by uploading one complete PDF copy to the Hesburgh Library's Electronic Dissertation and Thesis website, and provide two signed title pages and any other necessary forms to the Graduate School. One printed copy, with signed title page, and a PDF file should be submitted to the department Graduate Coordinator.

Additionally, the department provides a coordination service for binding. The candidate provides clean, printed copies of the dissertation, each signed by the dissertation director. The candidate and the advisor will decide who pays the cost of binding.

The Graduate Council requires that all doctoral dissertations be microfilmed by ProQuest Information and Learning. Microfilming costs are also paid at the Graduate School office, which handles this publication requirement for the candidate.

Revised

October 21, 2022, University of Notre Dame