

MARQUETTE UNIVERSITY
DEPARTMENT OF ELECTRICAL AND
COMPUTER ENGINEERING

GRADUATE STUDENT
HANDBOOK

OLIN ENGINEERING, ROOM 206
P.O. BOX 1881
MILWAUKEE, WI 53201-1881

January 2025

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I. INTRODUCTION

The purpose of this handbook is to summarize and explain the various procedures, policies, and requirements as they apply to graduate students in Electrical and Computer Engineering (EECE). While much of the material presented here duplicates information available on the Marquette University Graduate School Website (*Graduate School Bulletin*), it is not intended that this handbook replace the information in the Graduate School *Bulletin*. Rather it is hoped that it provides a convenient and concise statement of the numerous procedures specifically as they apply to Electrical and Computer Engineering students.

In addition to the EECE requirements listed in this handbook, graduate students must meet all Graduate School requirements as outlined in the Marquette University *Graduate Bulletin*. If there is a conflict between EECE requirements and Graduate School requirements, Graduate School requirements take precedence.

Students having questions not clearly answered in this document are urged to also consult:

- (1) the latest Marquette University Graduate Bulletin and list of deadlines
<https://bulletin.marquette.edu/grad/>
https://www.marquette.edu/mucentral/registrar/cal_index.shtml
- (2) the Marquette University web page www.mu.edu
Marquette University academic policies web page www.mu.edu/registrar/policies
Graduate School web page www.marquette.edu/grad
College of Engineering web page www.mu.edu/engineering
Department of Electrical and Computer Engineering web page
www.marquette.edu/electrical-computer-engineering/
- (3) their academic advisors
- (4) the EECE Director of Graduate Studies (DGS)
Contact information available at EECE web page (see above)
or by phone from EECE department office, (414) 288-6820
- (5) the Graduate School
Email mugs@marquette.edu , more contact information available at Graduate School web page (see above) or by phone from Graduate School office at, (414) 288-7137

Programs are offered in EECE at the master's level (thesis and non-thesis options) and the doctoral level. These may be pursued on a full-time or part-time basis. A five-year B.S./M.S. program is also offered.

There are several research focus areas within the program, including: signal processing, communications, and control systems; electromagnetic fields and waves; power and energy systems; electronic devices and microsystems; computer vision and image processing; embedded systems and internet of things (IoT); and machine learning. Students may, through selection of courses taken and their research, choose to concentrate in one or more of these areas, with the approval of their advisors.

II. GRADUATE STUDENT CLASSIFICATIONS

A. Academic Status

A graduate student may be classified as full-time, half-time or less than half-time. For more details on these classifications, please refer to the Marquette University *Graduate Bulletin*. <https://bulletin.marquette.edu/grad/policiesofthegraduateschool/#continuousenrollment>

B. Admission Status

A graduate student may be classified as having degree status, probationary degree status, temporary non-degree status, non-degree status, or visiting non-degree status. For more details on these classifications, please refer to the Marquette University *Graduate Website Bulletin* under “Admission”.

III. GENERAL REQUIREMENTS

A. Academic Load

Refer to the Marquette University *Graduate Website Bulletin* for academic load requirements.

B. Course Designations

Courses numbered in the 6000 and 8000 series designate strictly graduate level courses. Courses numbered in the 5000 series designate undergraduate level courses taken for graduate credit. It is required that graduate students in a 5000-level course do extra work beyond that required for the equivalent undergraduate (4000-level) course. 4000-level undergraduate courses (which do not include this additional work) may *not* be used for graduate credit.

C. Required Courses

Course requirements for all degree-program (master’s and doctoral) students are listed under each focus area, which can be found in the most recent EECE graduate programs focus area table at www.marquette.edu/electrical-computer-engineering/degree-specializations.php. These courses are offered each year in the fall and spring semesters, respectively. Students are normally expected to take these courses in their first year of graduate studies.

D. Department Colloquium

All full-time graduate students are required to take EECE 6952 Department Colloquium each semester. This course involves mandatory attendance at the EECE Department Colloquium Series. A grade of “Unsatisfactory” (UNC) in this course may result in loss of financial aid or dismissal from the program.

E. Independent Study and Seminar Courses

Independent study courses (EECE 6995 Independent Study) may be offered on occasion from individual faculty members. Independent study courses must be approved in advance using the *Approval for Independent Study Course 6995* form and an *Independent Study Course Contract (EECE 6995)* form. Students taking EECE 6995 courses must have a grade point average of at least 3.25 and a minimum of 6 completed credit hours at Marquette. Approval is required in advance from the course director, the student's advisor, and the DGS.

Independent study courses must be curricular in nature, covering specific material not available within existing courses. Independent study courses are specifically *not* allowed for research activities and experimental work.

Similarly, research seminar courses (EECE 6953 Research Seminar) may be offered on occasion from individual faculty members.

The total number of independent study (EECE 6995), research seminar (EECE 6953) credits and Cooperative Education (EECE 8986) that may be applied to one student's degree program(s) is limited to a maximum of 6 credit hours in the M.S. Plan A (Thesis option) program, a maximum of 6 credit hours in the Ph.D. program, and an overall maximum of 9 credit hours total for a combined M.S./Ph.D. program. Students in the M.S. Plan B (Course option) program cannot apply independent study or research seminar credits toward their degree program.

F. Undergraduate Students in Graduate Courses

An undergraduate senior may, with appropriate permissions, register for a 5000-level graduate course for either undergraduate credit or future graduate credit. Refer to the Marquette University *Graduate Website* for details on obtaining approval.

G. Continuous Enrollment

All graduate students admitted to a degree program must be continuously enrolled each semester (except summer sessions) to maintain graduate student status. Students are advised to consult with their advisors and the Marquette University *Graduate Website* for continuous enrollment processes and appropriate course designations.

H. Grade Point Average Requirement

All graduate students must maintain a grade point average of at least 3.0 in Marquette course work to graduate, as specified in the Marquette University *Graduate Bulletin*.

I. Prerequisite Courses

To make up for lack of appropriate background knowledge, students admitted into the graduate program without the appropriate background are required to take certain prerequisite courses (students are notified of these prerequisites upon admission by the DGS and/or assigned advisor). These prerequisites are normally specified from the following list of courses: MATH 1450, 1451, 2450, 2451; EECE 1610, ELEN 3001; and three of the six courses EECE 2030, ELEN 3020, ELEN 3030, EECE 3010, ELEN 3110, and COEN 2710. These courses must be taken early in the student's graduate program. Grades obtained in these courses must average at least 3.0, with

no grade less than a C. These courses are not used to meet regular degree requirements and are not included in graduate grade point average calculations, but their completion is necessary to be eligible for graduation.

J. Graduation Application

Each student planning to graduate in the current semester must file a *Graduation Application* with the Graduate School Office early in the semester. Refer to the Marquette University *Graduate Bulletin on the Website* for details on graduation application deadlines.

K. Graduate School Requirements

In addition to the EECE requirements listed above, graduate students must meet all Graduate School requirements as outlined in the Marquette University *Graduate Bulletin on the Graduate Website*. If there is a conflict between EECE requirements and Graduate School requirements, Graduate School requirements take precedence.

IV. ADVISING SYSTEM

The advising system intends to assist and guide a graduate student from the first day he or she enters Graduate School. The mechanism consists of an orientation meeting, the assignment of a temporary advisor, and the selection of a permanent advisor.

A. Orientation Meeting

At the beginning of each academic year, all graduate students are required to attend an orientation meeting. During this meeting, topics such as financial aid, program requirements, and research areas are discussed.

B. Temporary Advisor

After a student is admitted to the graduate program in Electrical and Computer Engineering, the DGS is the assigned temporary advisor. However, another faculty may also be assigned by the department.

C. Permanent Advisor

Each graduate student is required to select a permanent advisor in his/her area of interest as soon as possible, during the first semester of study in the case of the master's program and prior to taking the Written Qualifying Examination in the case of the doctoral program. The advisor will guide and supervise the graduate student's course work and research. The proper selection of a permanent advisor is very important and should be done only after careful consideration and discussions with all faculty members in the student's area of interest.

D. Change of Permanent Advisor

A student wishing to change permanent advisor must submit a written *request for Advisor Assignment / Selection / Change* to the DGS and Dept. Chairperson for approval. This letter should state his/her reason for desiring to make the change and should state the proposed advisor's name.

The DGS and Dept. Chairperson will consult with all parties involved, including the present or proposed advisor, and attempt to reach an appropriate decision. Should this process fail, the department chairperson will appoint a committee of three regular faculty members of the department to resolve the matter. The chairperson may be a member of this committee. The decision of this committee shall be the final action on this matter within the department.

In those instances, in which a request for a change of advisor is made and approved after submission of an *Outline for Dissertation, Thesis*, and/or a *Doctoral Program Planning Form*, the student is required to submit new versions of the appropriate forms.

E. Registration

For most courses, registration is accomplished using the University's Internet-based system CheckMarq. A student must have both a username and a password to use CheckMarq. Information Technology Services (ITS) assigns usernames and passwords to all new students for the duration of their studies at Marquette. Certain courses (EECE 6090, 6092, 6932/8932, 6953, 6995, 6999, and 8999) require the consent of the instructor. This is obtained by completing a *Request for Consent of Instructor* form, which must be returned to the Electrical and Computer Engineering department office prior to registration through CheckMarq. Other forms must be completed in order to register for continuous enrollment or independent study courses.

All students are expected to consult with their advisors and obtain their approval prior to registering for courses each semester. In addition to fulfilling minimal program requirements, course selections must form a cohesive overall plan of study as determined mutually by students and their advisors and must be consistent with approved program outline forms. Courses selected without advisor approval may not count toward a degree program.

Students wishing to add or drop a course, change a course to audit status, or drop all courses, must complete the appropriate form, available from the Graduate School web page.

V. MASTER'S DEGREE PROGRAM

A. Admission Requirements

1. Educational Background

Graduates of accredited colleges or universities with a bachelor's degree in Electrical Engineering, Computer Engineering, or equivalent are eligible for admission. Only those applicants whose undergraduate records show promise of success in graduate study are admitted. To qualify for admission, applicants must have, as a minimum, a B average in their total post-secondary school education.

2. Application for Admission

All applicants should file the following documents at least six weeks in advance of registration with the office of the Graduate School. No file is considered for admission until it is complete. See the Marquette University *Graduate Website* under "Admission" for further details.

- (1) A completed application form and fee.
- (2) Transcripts from all current and previous colleges/universities, except Marquette.
- (3) Three letters of recommendation.
- (4) GRE Scores (general test only).
- (5) A statement of purpose indicating the student's reasons for seeking the master's degree and declaring the student's general area of interest.
- (6) (For international applicants only) TOEFL score or other acceptable proof of English proficiency.

Admission is not official until the student is notified in writing of acceptance by the Graduate School. Admission cannot be made final until an official transcript has been received indicating the conferral of an undergraduate degree.

Admission is valid for one year beyond the desired entry date requested on the application for admission.

B. Master's Program Planning Form

The EECE department offers two options for earning a Master's degree, a Thesis Option (Plan A) and a Course Option (Plan B). By the end of the second semester of full-time studies, all Master's students must select and meet with their academic advisor, and together complete a "Master's Program Planning Form", including identifying whether they wish to pursue the Thesis or Non-Thesis Option as well as listing a proposed set of courses for their program of study. Please note that the 'Specialization' section on the form should be left blank. This program of study must be approved by the advisor and the EECE Director of Graduate Studies (DGS), as well as the Graduate School.

The student, advisor, and DGS will work together to ensure that the program conforms to departmental and Graduate School requirements, and that the program has appropriate breadth and depth. Changes between Thesis and Non-Thesis options may be requested using the "Master's Program Change of Plan".

C. Plan A (Thesis Option)

1. Course Requirements

Thirty semester hours are required, 24 coursework hours plus 6 hours of EECE 6999 Master's Thesis. At least 18 of the 24 coursework hours must be taken in EECE. At least 12 credits of the 24 credits must be from regular 6000 – level courses. (Regular 6000-level courses exclude independent study (EECE 6995), research seminar (EECE 6953) and Cooperative Education (EECE 8986).) The remaining courses must be selected in consultation with the student's faculty advisor from among those that are eligible for graduate credit.

The total number of independent study (EECE 6995), research seminar (EECE 6953) and Cooperative Education (EECE 8986) credits that may be applied to one student's degree program(s) is limited to a maximum of 6 credit hours in the M.S. Plan A program.

In selecting their coursework, all students should refer to requirements for all degree-programs as listed under each focus area, which can be found in the most recent EECE graduate programs focus area table at <https://www.marquette.edu/electrical-computer-engineering/degree-specializations.php>. With prior approval, a maximum of 8 semester hours of course work from other institutions or other programs may be transferred into a student's master's program. A course will be considered for transfer credit only if the grade is B or better and the course is acceptable for graduate credit at the institution at which it was taken. Students applying for transfer of credit must complete a *Request for Transfer of Credit* form available from the Graduate School and provide materials (Official course outlines and syllabus) for those courses.

2. Thesis Requirements

By the end of the second semester, each Plan A master's degree student must submit an outline of the proposed thesis on an *Outline for Dissertation, Thesis, Professional Project, or Essay* form for approval. As part of this process a master's committee is established for the purpose of evaluating the thesis and conducting the comprehensive examination. It is recommended that the student has an approved outline before taking six hours of thesis credit (EECE 6999).

An acceptable master's degree thesis must meet each of the following three conditions:

1. The thesis must reflect the student's originality, creativity, and imaginative work.
2. The thesis must demonstrate the student's research ability. This includes (a) literature study and (b) some contribution to the state of the art or originality in problem solving. Old methods applied to new problems, new methods applied to old or new problems are acceptable. But old methods applied to old problems are not generally acceptable.
3. The format of the thesis must follow the Graduate School Thesis Directives.

When the student and his/her advisor consider the thesis to be in final form, the student should submit a copy to each member of his/her master's committee. This should be done at least two weeks before the scheduled thesis defense. It is assumed that a thesis will be reviewed until it meets the approval of all committee members. However, when complete consensus seems impossible to achieve, it will be accepted if the advisor and one other committee member approve it. Upon approval, the *Thesis Approval* form is signed by the members of the committee. The student then submits the thesis to the Graduate School (Submission guideline can be found on the Graduate School Website). It is also the student's responsibility to provide a final copy of the thesis for each member of the master's committee.

3. Thesis Defense

At the end of the master's program, upon completion of the thesis, an oral final comprehensive examination (thesis defense) is given. The advisor will inform the EECE department chairperson of the outcome of the examination, who in turn files this information with the Graduate School on a *Master's Comprehensive Exam Report* form.

Students who fail this examination on their first attempt are permitted to take it a second time, with department approval. It is the obligation of the student to arrange a time and place on campus for the comprehensive examination suitable for all committee members, and to meet all appropriate deadlines indicated in the Graduate School academic calendar.

4. Master's Committee Membership

Each master's committee consists of at least three members, mutually selected by the student and his/her advisor. The advisor is the committee director and must have a regular faculty appointment in EECE at Marquette University. At least two members of the committee (including the director) must have regular faculty appointments in EECE at Marquette University. Any committee member from outside the University needs to meet the Graduate School committee requirements.

D. Plan B (Course Option)

1. Course Requirements

Thirty (30) semester hours, at least 21 of which must be in EECE, are required. At least 18 credits of the total program coursework and at least 12 credits of the EECE coursework must be taken at the strictly graduate level (6000 level).

Students in the M.S. Plan B program may not apply independent study (EECE 6995) or research seminar (EECE 6953 credits. Special permission by the DGS could be given for a maximum of three cooperative education (EECE 8986) credits toward their degree program. The remaining courses must be selected in consultation with the student's faculty advisor from among those that are eligible for graduate credit. Course requirements for all degree-program (master's and doctoral) students are listed under each focus area, which can be found in the most recent EECE graduate programs focus area table at www.marquette.edu/electrical-computer-engineering/degree-specializations.php. In addition, as noted in Section III.E, independent study and research seminar credits are not permitted in this program option. Courses must form a cohesive overall plan of study as determined mutually by each student and his or her advisor.

The regulations for transfer of credit from other institutions or programs are the same as those for Plan A, except that, with approval, up to 9 semester hours may be transferred.

2. Written Comprehensive Exam Requirements

Students in the Master's Course Option program must successfully pass a written comprehensive examination prior to graduation. The exam covers materials listed in the most recent EECE graduate programs focus area and the M.S. comprehensive exam requirements. The comprehensive exam is administered simultaneously with the Ph.D. Written Qualifying Exam and is offered once a year in January. Students may take the comprehensive exam at the first available exam offering after completing the necessary courses in their area of study. A full description of the exam content, rules and procedures are detailed in the *Registration Form and Rules and for the EECE Comprehensive Examination*

document, <https://www.marquette.edu/electrical-computer-engineering/documents/wqe-ms-comp-rules.pdf> available from the EECE office and webpage.

E. Five-Year B.S./M.S. Program

1. Program Eligibility

The EECE Department offers a Five-Year B.S./M.S. Program where eligible students may obtain both a Bachelor's degree and a M.S. EE degree in five years. Students with a GPA of 3.5 or better in their Mathematics, Science and Engineering courses are eligible to apply to this program in their junior year. This program is available to undergraduate students in EECE or Physics.

Students wishing to participate in the Five-Year Program must apply and be admitted to the program before their senior year, using the same procedures outlined in Section V.A, with the exception that GRE test scores are not required. Students need to fill out an *Application for Graduate Admission and Financial Aid* form (available from the Graduate School) and follow the guidelines in both the Marquette Graduate Bulletin and this document for admission to the program. On the application, in the section "Graduate School Plans", students should check "B.S. to M.S."

2. Requirements

Students in the program may take graduate courses in their junior or senior undergraduate year (up to 12 credits total, minimum grade of B required). Up to nine graduate credits count toward both degrees. The remaining courses and credits toward the M.S. degree are completed during the fifth year. For students following Plan A (Thesis Option), work on the thesis research should begin during the summer between the junior and senior undergraduate years.

Undergraduate students wishing to take courses for graduate credit must fill out a *Permission to Enroll in a Graduate Course* form, available from the Graduate School. This is done for both 5000-level and 6000-level courses. Students in the Five-Year Program wishing to apply course(s) toward both degrees must check the box "5-year program" in the "Additional Information" section of the form. Permission forms for courses applied only to the M.S. degree should check the box "I do not intend to use this course to satisfy undergraduate requirements". For 5000-level courses, students must also fill out a "Graduate Credits Requested for Undergraduate Course" form. In addition, the program requires all students to attend the EECE 6952 Department Colloquium for two semesters in their fifth year.

Once the undergraduate degree is completed, students must fill out a *Master's Degree Transfer of Credit Request* form to formally transfer the coursework taken into their M.S. program. All coursework taken as an undergraduate must meet university transfer guidelines before it can be used toward the Master's degree, including a maximum of 12 transfer credits and a minimum grade of B in all courses.

Students having interest in this program should consult with the DGS and their advisor.

F. General Electric Healthcare Master's Program

This program is available only to employees of G.E. Healthcare Edison program and includes the courses EECE 6090 Advanced Engineering I, EECE 6092 Advanced Engineering II, and EECE 6094 Advanced Engineering III.

1. Students in Master's Plan A or Plan B may receive credits for EECE 6090, EECE 6092 and EECE 6094 as general electives to partially fulfill their course requirements.
2. EECE 6090, 6092, and 6094 cannot be used towards course requirements in a Ph.D. program.

G.E. Healthcare employees wishing to enter the program must apply using the same procedures outlined in Section V.A, with the exception that GRE test scores are not required. Students need to fill out an Application for Graduate Admission and Financial Aid form (available from the Graduate School) and follow the guidelines in both the Marquette Graduate Bulletin and the EECE Department's Graduate Student Handbook (available from the department office or online) for admission to the program. On the application it should be noted that applicants are applying as part of the G.E. Healthcare Edison program.

G. Time Limitations

All work for master's degrees must be completed in accordance with the time limitations outlined in the Marquette University *Graduate School Bulletin Webpage*.

In certain special circumstances, extensions of time may be granted. Students requiring such extensions must complete a *Request for Extension of Time* form.

VI. DOCTORAL DEGREE PROGRAM

A. Admission Requirements

1. Educational Background

A M.S. degree or equivalent in an appropriate field of study is required for admission to the EECE Ph.D. program. However, direct admission into the Ph.D. program with only a B.S. degree is also allowed for *qualified* students. In that case, students must first complete the course requirements for the M.S. degree before continuing into the Ph.D. program.

2. Application for Admission

All applicants should file the following documents at least six weeks in advance of registration with the office of the Graduate School. No file is considered for admission until it is complete. See the Marquette University *Graduate Bulletin* for further details.

- (1) A completed application form and fee.
- (2) Transcripts from all current and previous colleges/universities, except Marquette.

- (3) Three letters of recommendation
- (4) GRE Scores (general test only).
- (5) A statement of purpose indicating the student's reasons for seeking a doctoral degree and declaring the student's general area of interest.
- (6) (For international applicants only) TOEFL score or other acceptable proof of English proficiency.

Admission is not official until the student is notified in writing of acceptance by the Graduate school.

Admission is valid for one year beyond the desired entry date requested on the application for admission. It is strongly recommended that the applicant identify a dissertation/research advisor.

B. Program Requirements

1. Course Requirements

Ph.D. (with M.S.) program: requires a total of 24 post-master's credit hours of coursework, plus an additional 12 dissertation credits. (A master's degree is considered to be the equivalent of 24 coursework credits, so that this course work requirement is the equivalent of 48 credits beyond the bachelor's degree, exclusive of dissertation credits.) Other requirements include:

- Completion of a Doctoral Program Planning Form by end of first year of fulltime studies with help of research advisor
- Completion of the doctoral written qualifying examination (WQE) by the end of the third semester of study. The requirements of the WQE, discussed in detail in Section VI.B.3, should be considered carefully in selecting an appropriate program of study
- Course requirements are listed and determined by the selected focus area
- At least 24 of the credits of course work must be taken at Marquette University
- At least 12 credits of the 24 credits (after the 24 credits hours for the M.S. degree) must be from regular 6000 – level courses. (Regular 6000-level courses exclude independent study (EECE 6995), research seminar (EECE 6953) and Cooperative Education (EECE 8986).) Please also see the course requirements for the M.S. degree.
- At least 18 of the 24 credits of course work must be taken in EECE
- The total number of independent study (EECE 6995), research seminar (EECE 6953) credits and cooperative education (EECE 8986) that may be applied to one student's degree program(s) is limited to a maximum of 6 credit hours in the Ph.D. program
- EECE 6952 Department colloquium is required each semester for all full-time students
- EECE 8999 Doctoral Dissertation
- Students must successfully complete a dissertation together with a public dissertation defense of their work
- Completion of all university Graduate School requirements and forms

Ph.D. (with B.S.) program (for *qualified* students with only a B.S. degree): requires a total of 48 post-baccalaureate's credit hours of coursework, plus an additional 12 dissertation credits. Students must complete the course requirements for the M.S. degree to continue in the program. If the student wants to actually earn the M.S. degree along the way, he or she must fulfill all the M.S. degree requirements with the advisor's approval.

Other requirements are similar to the ones listed above:

- At least 24 of the credits of courses must be taken at Marquette University. At least 12 credits of the 24 credits (after the 24 credits hours for the M.S. degree) must be from regular 6000 – level courses. (Regular 6000-level courses exclude independent study (EECE 6995), research seminar (EECE 6953) and Cooperative Education (EECE 8986).) Please also see the course requirements for the M.S. degree.
- The total number of independent study (EECE 6995), research seminar (EECE 6953) credits and cooperative education (EECE 8986) that may be applied to one student's degree program(s) is limited to an overall maximum of 9 credit hours total for a combined M.S./Ph.D. program.

Full details of the doctoral program can be found in the EECE Graduate Student Bulletin.

Please note that EECE 6090, 6092, and 6094 cannot be used towards course requirements in a Ph.D. program (as described in section V.F).

With prior approval, a maximum of 9 semester hours of course work from other institutions or other programs may be transferred into a student's doctoral program. A course will be considered for transfer credit only if the grade is B or better and the course is acceptable for graduate credit at the institution at which it was taken. Students applying for transfer credit must complete a *Request for Transfer of Credit* form available from the Graduate School Office (and provide official course outlines and syllabus) after completion of at least six semester hours at Marquette (nine if on probation). All transfer credit for doctoral programs is approved on a case-by-case basis, in consultation with the DGS, the EECE Graduate Committee, and the student's Ph.D. advisor. Once approved, transfer credits should be listed with other coursework on the *Doctoral Program Planning Form* for formal committee approval.

2. Doctoral Program Planning Form

By the end of the first year of full-time studies, doctoral students must formally identify a research advisor and with their advisor's assistance complete a *Doctoral Program Planning Form* indicating a proposed set of courses for their program of study. Please note that the 'Specialization' section on the form should be left blank. This program of study must be approved by the advisor and the DGS as well as the Graduate School.

The doctoral student, the advisor, and the DGS will work together to ensure that the program conforms to departmental and Graduate School requirements, and that the program has appropriate and cohesive breadth and depth for advanced study.

Changes to the program of study may be made using the *Doctoral Program Planning Form Amendment*.

3. Doctoral Written Qualifying Examination

Doctoral students are required to take the EECE Doctoral Written Qualifying Examination, (WQE) by the end of their third semester of study. The WQE is a written exam, administered once a year in January, which the student must pass to become a doctoral candidate and continue in the program.

For the EECE WQE rules click the following www.marquette.edu/electrical-computer-engineering/documents/wqe-ms-comp-rules.pdf

Copies of the rules and focus areas are posted on the departmental website and hard copies are available in the EECE department office.

Master's students taking the WQE exam do so voluntarily and will not have their M.S. programs affected by the results of the exam. Passing the exam does not automatically admit students to the doctoral program nor guarantee admittance; they must still apply and be accepted. However, if and when they are accepted, such students will have already met the WQE requirements and will be advanced to doctoral candidacy as soon as they identify a research advisor, complete a Doctoral Program Planning form, and meet course and residency requirements. Failing the exam while an M.S. student *does* count against the limit of two maximum attempts at the WQE.

Eligibility for Ph.D. Written Qualifying Exam

All EECE M.S. Thesis Option or Ph.D. graduate students are eligible to register for and take the Doctoral WQE at any time. It is highly recommended that Ph.D. students and M.S. students planning to apply to the Ph.D. program plan their coursework in accordance with the exam requirements and take the exam as soon as they have taken the recommended courses.

Time Requirement for Doctoral Written Qualifying Exam

Full-time Ph.D. students are required to take the WQE by the end of their third semester in the doctoral program.

4. Doctoral Committee Membership

Each doctoral committee consists of at least five members, mutually selected by the student and his/her advisor. The advisor is the committee director and must have a regular faculty appointment in EECE at Marquette University. At least four members of the committee (including the director) must have regular or adjunct faculty appointments at MU and at least three must have regular primary faculty appointments in EECE at Marquette University.

5. Doctoral Dissertation Outline and Proposal

Ph.D. candidates are required to complete an *Outline for Dissertation* and present an oral dissertation proposal to their committee by the end of their fourth semester of study. The dissertation outline must clearly convey the original research contribution of the proposed work. Following the dissertation proposal, the outline is approved via the *Outline for*

Dissertation, Thesis form, by the dissertation advisor, the committee members, the DGS, and the Graduate School.

After the outline is approved the student may register for the required twelve hours of dissertation credit (EECE 8999).

6. Final Examination

Upon completion of the dissertation work and formal dissertation document, a public oral final examination is given. The candidate must arrange a time and place on campus for the final examination and submit an *Announcement of Final Public Examination for Doctoral Degree* to the Graduate School at least four weeks in advance.

Approval of the dissertation final exam is conveyed by the committee using the *Dissertation Approval* form.

7. Dissertation Document

Upon approval of the final dissertation document, an electronic copy must be submitted to the Graduate School. In addition, a *Dissertation Approval* form signed by the members of the committee must also be submitted to the Graduate School. Official approval requires approval of the dissertation director and committee members.

An acceptable doctoral dissertation must meet each of the following three conditions:

1. The dissertation must represent an original research contribution.
2. The dissertation must show a clear ability to do independent research.
3. The dissertation format must follow the Graduate School *Dissertation Directives*.

8. Graduate School Requirements

In addition to the EECE requirements listed above, Ph.D. students must meet all Graduate School requirements as outlined on the Marquette University *Graduate School Website*.

C. Time Limitations

All work for doctoral degrees, including the final examination and submission of dissertation document, must be completed in accordance with the time limitations outlined in the Marquette University *Graduate Bulletin*.

In certain special circumstances, extensions of time may be granted. Students requiring such extensions must complete a *Request for Extension of Time* form.

VII. GRADING AND EVALUATION OF PERFORMANCE

A. Grading System

The letter grades A+, A, A-, B+, B, B-, C+, C, F will be assigned for graduate course work at the end of each semester. Grades of C- and D are not issued in 5000, 6000 or 8000 level courses. F grades are included in grade point average calculations. Detailed explanations of letter grades are given in the Marquette University *Graduate Bulletin*.

B. Academic Review

The department evaluates the academic performance of all students at the close of each semester and/or academic year. In order to graduate, a grade point average of at least 3.0 is required, so all graduate students are expected to maintain a grade point average of at least 3.0. Details regarding failure to meet this criterion, including warnings, academic probation and dismissal, are outlined in the Marquette University *Graduate School Website*.

Satisfactory academic work is not determined exclusively by course grades, but by an overall assessment of academic performance. Grades are, however, an important factor in the evaluation process. Multiple C's, or a single F, are indications of serious academic concern, which may require the student to suspend graduate studies and successfully complete a remedial course before continuing in the program.

C. Appeals

As specified in the Marquette University *Graduate School Website*, students have the right to appeal the imposition of any sanctions due to unsatisfactory academic performance or findings of academic dishonesty. Responsibility to decide the validity of appeals rests with the Dean of the Graduate School advised by the Board of Graduate Studies. Appeals should be made in writing to the Dean of the Graduate School.

D. Grade Appeals

As specified on the Marquette University *Graduate School Website*, grade appeals for graduate courses are heard by the school or college that teaches the course. The grade appeals process for courses taught by the College of Engineering is published on the COE web site, and students who wish to appeal their grade in an EECE course should consult this document and follow the outlined process. Students are strongly advised to discuss grading concerns with their course instructor and their academic advisor prior to making an official appeal.

E. Academic Honesty Policies

Any student who is found to have engaged in violating academic honesty policies is subject to appropriate academic discipline, as specified by the *College of Engineering Academic Honesty Policy*, and the *Marquette University Academic Honesty* and *Marquette University Research Misconduct* policies.

VIII. FINANCIAL AID

Five major categories of financial aid are available to degree-status graduate students in Electrical and Computer Engineering: scholarships, fellowships, teaching assistantships, research assistantships, and loans. Students admitted on probation are not eligible for financial aid but may be considered once probation has been removed. The term of financial aid is normally an academic year (10 months), but in some instances may be one semester (5 months), or one year (12 months). Only very limited amounts of financial aid are available during the summer.

Graduate students receiving financial aid may accept no outside employment and must be enrolled full-time either by virtue of course work or continuous enrollment. Master's students receiving any

financial aid must follow Plan A. Five years B.S./M.S. students are not eligible to receive TA and RA-ships from the department. However, they may receive financial aid (only stipend) from individual faculty in their 5th year of study. Continued support is not guaranteed, but is based on academic performance, performance of assigned duties (for teaching and research assistants) and availability of funds. Master's students will normally be supported for no more than four semesters and doctoral students for no more than six semesters. Teaching and research assistants are expected to be involved with assigned duties and/or graduate research during the full term of their assistantships, not just when classes are in session.

Students seeking financial aid other than loans are required to submit an application for financial aid to the Graduate School no later than February 15 of the academic year prior to the one for which aid is being sought (November 15 for the spring semester and April 15 for summer sessions). See the Marquette University *Graduate School Website* for additional details.

A. Scholarships

Tuition scholarships are available on a very limited basis through the EECE department. These cover tuition only and range from 1 to 9 credit hours per semester. No service is required of the student in return for a scholarship.

B. Fellowships

Fellowships typically provide a stipend and, in some instances, tuition remission. Fellowships and traineeships may also be available from individual faculty members having external grants. Students are also urged to seek fellowship assistance available from various outside agencies, foundations, and other organizations.

C. Teaching Assistantships

Teaching assistantships typically provide students with a stipend and 9 credit hours of tuition remission per semester. In return the students are expected to perform satisfactorily 20 hours of teaching-related assignments per week. Students with teaching assistantships are normally limited to a 9 credit-hour course load per semester.

D. Research Assistantships

Research assistantships typically provide students with a stipend and 9 credit hours of tuition remission per semester. In return the students are expected to satisfactorily perform 20 hours of research-related assignments per week. Students with research assistantships are normally limited to a 9 credit-hour load per semester. Research assistantships may also be available from individual faculty members who have external research grants and contracts (stipend levels and tuition remission will vary with the funding agency).

E. Loans

Limited loan assistance is available to assist qualified students who, without such aid, would be unable to attend the University. Students are eligible for student loans if they are attending the University at least half-time and are in good academic standing. No applicant will be considered for loan assistance until he/she has been formally admitted to the Graduate School.

For specific information on loans and other resources available to graduate students attending Marquette, contact the Office of Student Financial Aid.

APPENDIX A. SUMMARY OF PROGRAM REQUIREMENTS

The following sections briefly summarize the requirements for each of the graduate programs. Students are also urged to consult with the DGS for questions they may have regarding program requirements.

All full-time students must take EECE 6952 each semester. Students must be enrolled every semester (either in regular course work or via continuous enrollment). All work for a degree must be completed, with a GPA of at least 3.0, in accordance with the time limitations outlined in the Marquette University Graduate School Bulletin Webpage. In certain special circumstances, extensions of time may be granted. Students requiring such extensions must complete a Request for Extension of Time form. All prerequisite requirements must be satisfied, if applicable.

A. Master's Degree - Plan A (Thesis Option)

Course requirements are listed and determined by the selected focus area, which can be found in the program focus area tables.

At least 18 of the 24 credits of coursework must be taken in EECE.

At least 12 credits of the 24 credits must be taken at the strictly graduate level (6000+ level).

Other requirements include:

EECE 6999 (thesis credits, 6 credit hours total)

Advisor Selection

Outline for Thesis

Master's Program Change of Plan (optional, only if changes to outline needed)

Graduation Application

Thesis document

Thesis checklist

Comprehensive Examination (oral, concentrated on thesis)

Thesis Approval Form (completed by advisor)

Master's Comprehensive Exam Report (completed by advisor)

B. Master's Degree - Plan B (Course Option)

Thirty (30) semester hours, at least 21 of which must be in EECE, are required, and at least 12 credits of the EECE coursework must be taken at the strictly graduate level (6000 level).

Students in the M.S. Plan B program may not apply independent study or research seminar credits toward their degree program. The remaining courses must be selected in consultation with the student's faculty advisor from among those that are eligible for graduate credit. Course requirements for all degree-program (master's and doctoral) students are listed under each focus area, which can be found in the most recent EECE graduate programs focus area Table.

Other requirements include:
Comprehensive Exam
Graduation Application

C. Doctoral Degree

Ph.D. (with M.S.) program: a total of 24 post-master's credit hours of coursework, plus an additional 12 dissertation credits. (A master's degree is considered to be the equivalent of 24 coursework credits, so that this course work requirement is the equivalent of 48 credits beyond the bachelor's degree, exclusive of dissertation credits.)

Ph.D. (with B.S.) program (for qualified students with only a B.S. degree): a total of 48 post-baccalaureate's credit hours of coursework, plus an additional 12 dissertation credits. Students must complete the course requirements for the M.S. degree to continue in the program. If the student wants to actually earn the M.S. degree along the way, he or she must fulfill all the M.S. degree requirements with the advisor's approval.

Other requirements include:
EECE 8999 (dissertation credits, 12 credit hours total)
Residency (1 year)
Advisor Selection form
Doctoral Program Planning form
Doctoral Program Planning form amendment (optional, if changes needed)
Written Qualifying Examination (administered by department)
Doctoral Qualifying Examination Committee Chairperson's Summary (completed by DGS)
Advancement to Doctoral Candidacy (completed by DGS)
Outline for Dissertation
Graduation Application
Dissertation
Dissertation checklist
Announcement for Public Defense of the Dissertation (30 days in advance)
Dissertation Defense (oral, public, on dissertation)
Dissertation Approval Form (completed by advisor and committee)