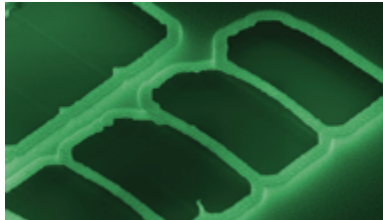
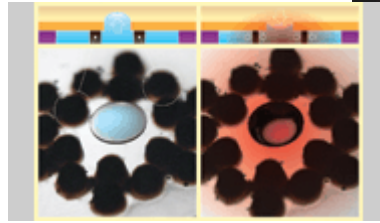
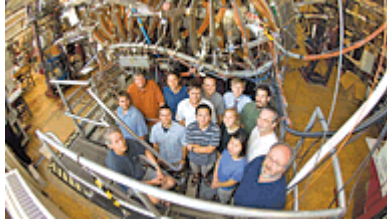


DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

University of Wisconsin-Madison Graduate Student Handbook



THE COLLEGE OF
ENGINEERING
UNIVERSITY OF WISCONSIN-MADISON



For Students Admitted for Fall 2007 and Thereafter
Updated Spring 2012

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Welcome to the Electrical and Computer Engineering Department at the University of Wisconsin – Madison

Welcome to the ECE graduate program!

We hope you find your stay in Wisconsin both challenging and instructive. This booklet contains a summary of requirements. It also provides you with a variety of information you will need as you proceed toward your advanced degree. We have attempted to make degree requirements flexible enough to accommodate a wide range of study and research objectives. Our goal is to treat each graduate student as a special individual. If you find that your particular situation is not adequately covered in this booklet, or if for any reason you feel your case warrants deviation from a particular rule, the ECE Graduate Committee is available to listen to your case.

Information about the content of graduate courses and the general guidelines for our graduate program can be found in the Graduate School Bulletin, *Natural Sciences and Engineering*. Additional information about our program can be obtained from the Graduate Committee Chair, the Fundamentals Examination Chair, Ph.D. Qualifying Exam Chair, and the Fellowships and Recruiting Committee Chair. The Graduate Program Staff can help you identify the person or committee best suited to assist you. Suggestions for improvements in this booklet and other graduate advising materials are welcome and should be addressed to the Chair of the ECE Graduate Program.

This handbook should answer most of your day-to-day questions concerning the routine operation of the ECE Department.

We wish you all the best in your efforts here and look forward to working with you.

Sincerely,

John Booske,
Professor and Chair

2.0 South Student Services Center

South Student Services Center Mission, Vision, and Objectives

Mission Statement: The South Student Services Center within the College of Engineering at the University of Wisconsin-Madison provides support to both undergraduate and graduate students. We support undergraduate students who are declared Civil Engineering, Computer Engineering, Electrical Engineering, or Geological Engineering majors and graduate students studying Civil and Environmental Engineering, Electrical Engineering, or Geological Engineering.

Vision: The vision of the South Student Services Center within the College of Engineering at the University of Wisconsin-Madison is to: (1) be, and be recognized as, an effective and efficient student services center for both the students and the academic programs that we serve; (2) provide quality academic advising in partnership with the student's faculty advisor; and (3) continually ask ourselves "is this good for our students?"

Objectives: The South Student Services Center within the College of Engineering at the University of Wisconsin-Madison will strive to attain its vision by...

- ...creating a welcoming, inclusive, and supportive learning environment for SSSC students
- ...providing services of the highest quality that help SSSC students to develop and enrich their academic abilities, personal aspirations, and professional goals
- ...facilitating students' entry into and success within SSSC graduate programs
- ...continually improving the recruitment and retention of engineering students by enhancing the COE's interaction with: (1) UW-Madison students, programs, and student service organizations and (2) prospective SSSC students.
- ...supporting and collaborating with the student organizations that serve SSSC students
- ...recruiting, supporting, and retaining the best undergraduate and graduate students, especially women and underrepresented groups
- ...assessing and evaluating the dual advisor model being piloted by the SSSC
- ...collaborating with faculty and the appropriate advising and curriculum committees within each program to help students achieve their academic goals
- ...providing student feedback to the faculty and appropriate committees within each program
- ...streamlining administrative processes amongst the Civil and Environmental Engineering, Electrical and Computer Engineering, and Geological Engineering programs

South Student Services Center Staff:

| | | |
|--|------------------------|-----------------------|
| Katie Bleier , kbleier@engr.wisc.edu | 2304 Engineering Hall | Phone: (608) 890-0864 |
| Stacy Harnett , sharnett@wisc.edu | 2304a Engineering Hall | Phone: (608) 890-4594 |
| Sherry Liantonio , stlianto@wisc.edu | 2258 Engineering Hall | Phone: (608) 890-2420 |
| Cheryl Loschko , loschko@engr.wisc.edu | 2312 Engineering Hall | Phone: (608) 265-5570 |
| Mary Possin , mcpassin@wisc.edu | 2308 Engineering Hall | Phone: (608) 890-2075 |

2.1 Introduction to the Electrical and Computer Engineering (ECE) Department

2.2 Important People to Know

Department Administration

John Booske

http://www.engr.wisc.edu/ece/faculty/booske_john.html

ECE Department Chair & Professor

3436 Engineering Hall (EH) | 608.260.0804 | booske@ngr.wisc.edu

Yu Hen Hu

http://www.engr.wisc.edu/ece/faculty/hu_yu.html

ECE Department Vice Chair & Professor

3625 EH | 608.260.0804 | hu@engr.wisc.edu

Bernard Lesieutre

http://www.engr.wisc.edu/ece/faculty/lesieutre_bernard.html

Graduate Chair & Professor

2557a EH | 608.890.1883 | lesieutre@engr.wisc.edu

Mark Allie

http://www.engr.wisc.edu/ece/faculty/allie_mark.html

TA Coordinator

3535 EH | 608.262.3618 | allie@engr.wisc.edu

Lori Burrow

http://www.engr.wisc.edu/ece/staff/burrow_lori.html

Academic Department Manager

2422 EH | 608.262.8272 | burrow@engr.wisc.edu

Faculty Contact Information for the Four Primary Areas of Study in ECE

Applied Electro Sciences:**David Anderson**

http://www.engr.wisc.edu/ece/faculty/anderson_david.html

Professor

1422 EH | 608.262.0172 | dtanders@facstaff.wisc.edu

Computer:**Kewal Saluja**

http://www.engr.wisc.edu/ece/faculty/saluja_kewal.html

Professor

4611 EH | 608.262.6490 | saluja@engr.wisc.edu

Devices and Circuits:**Luke Mawst**

http://www.engr.wisc.edu/ece/faculty/mawst_luke.html

Professor

4617 EH | 608.263.1705 | mawst@engr.wisc.edu

Systems Modeling:**James Bucklew**

http://www.engr.wisc.edu/ece/faculty/bucklew_james.html

Professor

3417 EH | 608.262.3760 | bucklew@engr.wisc.edu

Computer Support

Computer Aided Engineering (CAE)

<http://www.cae.wisc.edu/>

1410 Engineering Drive | 608.262.5349 | <http://www.cae.wisc.edu/contact>

Computer Printing Services

2415 EH | duplicating@engr.wisc.edu

Electronics Repairs

Frank Bayer

http://www.engr.wisc.edu/ece/staff/bayer_frank.html

Electronics Technician – Repairs and Supervisor Student Electronics Shop

1536 EH | 608.265.3539 | OR 1538 EH | 608.262.9656 | bayer@coefac.engr.wisc.edu

Financial Services

Renee Starks

http://www.engr.wisc.edu/ece/staff/starks_renee.html

Payroll & Benefits Specialist

2440 EH | 608.262.3842 | starks@engr.wisc.edu

Keys

Keri Johnson

University Services Program Associate

2420 EH | 608.262.3840 | kljohnson7@wisc.edu

South Student Services Center Staff

Sherry Liantonio

http://www.engr.wisc.edu/admin/staff/liantonio_sheralynn.html

Graduate Program Coordinator

2258 EH | 608.890.2420 | stlianto@wisc.edu

Katie Bleier

http://www.engr.wisc.edu/admin/staff/klein_julie.html

Supervisor of Student Services Center and Academic Advisor

2304 EH | 608.890.0864 | kbleier@engr.wisc.edu

Cheryl Loschko

Graduate Admissions Coordinator

2312 EH | 608.265.5570 | loschko@wisc.edu

2.3 Department of Electrical and Computer Engineering Policies and Information

Academic Conduct

The ECE Department assumes that all students possess high academic integrity. This means that all homework and exams are solely the product of the student whose name appears on the paper and that it truthfully represents work completed by the student. Students who fail to maintain this standard are subject to disciplinary action according to the University of Wisconsin Administrative Code UWS 14.03, found online at <http://students.wisc.edu/saja/misconduct/UWS14.html>. For more information, contact the Division of Student Life, <http://students.wisc.edu/>.

Address Changes

It is extremely important to keep your contact information up-to-date. Address changes should be made at your **MY UW** account

Advisors

All students must have a faculty course (academic) advisor. **New students must declare a course advisor by the end of the second week of classes in their first semester. Once you have selected an advisor, please notify staff in the Student Services office via email at stlianto@wisc.edu.** If students need assistance in locating an advisor, they should contact the faculty member for their area of study. Faculty contact information for the major areas of study is listed above. The Graduate Committee Chair, Department Chair and Vice Chair of Operations are also available for assistance should problems arise.

Building Access and Keys

Building keys for outside doors and offices are issued to those graduate students who have been assigned desk or lab space. Other students may receive keys, if they obtain written permission from a supervising faculty member. A deposit of \$5 is required for each key; all keys must be returned or renewed each semester. Students needing keys should see staff in Room 2420 Engineering Hall. The building is open from 7:00 a.m. to 10:00 p.m. Monday through Friday and 7:00 a.m. to Noon on Saturday. The building is closed on Sundays and football Saturdays.

Building Manager

Report any maintenance problems in Engineering Hall to Lori Burrow in Room 2422 EH or burrow@engr.wisc.edu or report to 2420 Engineering Hall (262-3840). In case of an emergency, dial 911.

Bulletin Boards

Near 1423 EH – TA and PA information posted & other graduate information

Near 2421 EH – Schedule of Classes & Enrollment Information

Near 2258 EH – Graduate Student Information posted

Computing Facilities

Computer Aided Engineering (CAE) has many facilities. See <http://www.cae.wisc.edu/> for details.

Desk Space

See academic advisor for information on desk space.

Division of Information Technology (DoIT) (<http://www.doit.wisc.edu/>)

The Division of Information Technology (DoIT) provides a variety of technology services to the University of Wisconsin-Madison, as well as limited service to UW System and other State entities. Their services span desktop-to-server-to-mainframe computing, networks, telecommunications, Internet connectivity, administrative and academic systems, security, instructional technology, plus many support services.

Division of Information Technology (DoIT) Help Desk (<http://kb.wisc.edu/helpdesk/>)

The Division of Information Technology (DoIT) Help Desk plays a key role in helping DoIT fulfill its strategic direction, "Provide Outstanding Delivery of Technology Services." The Help Desk is committed to customer service excellence by making support services readily available 24 hours a day, providing an excellent online knowledgebase and well-trained professional staff to answer your questions, and by continuously looking for ways to improve and expand services.

ECE Copy Center

ECE operates duplicating machines in Room 2415. This facility is managed by the Duplicating and Supplies Manager and is used exclusively for department administration, instruction, and research. DUPLICATING MACHINES ARE NOT FOR PERSONAL USE. Normally, only students who have research assistantships and teaching assistantships are given a key and required code numbers. Other students must use local photocopy shops or copiers in the libraries and student unions.

ECE Directory

Those students who have appointments in ECE or anywhere else on campus will be included in the directory for that semester.

Email

Most ECE information is sent by email. All incoming students are issued a Wisemail email account. This email account must be kept activated and cleaned out at all times.

Engineering Career Services (ECS) (<https://ecs.engr.wisc.edu/public/>)

ECS staff provides resources and expertise in the areas of career exploration, resume writing, interviewing skills, corporate site visits, co-ops, internships, summer jobs and permanent jobs. ECS provides services to MS and PhD students. They offer assistance in skills assessment, graduate school decisions and transitioning from student to professional. In addition, we connect employers with University of Wisconsin-Madison engineering students through their on-line webECS recruiting system (for resume access), Fall and Spring Career Connection career fairs and on-campus interviews. For more information, email ecs@engr.wisc.edu.

Enrollment in Courses

You will receive an invitation to enroll email from the Office of the Registrar. Please enroll for courses at your assigned time. If you do not, courses might close or be cancelled. Please seek course advice from faculty before enrolling. Information on courses offered in ECE can be found at: <http://courses.engr.wisc.edu/ece>.

Financial Support: Financial support is available through a variety of appointments.

- 1) Research Assistantships: Students should contact professors in their area of interest. Professors decide whom they will appoint on their research grants.
- 2) Teaching Assistantships: Students can obtain an application form online at <http://www.engr.wisc.edu/cmsdocuments/ECETAApplicationUS.pdf>. Non-native speakers of English are required to take the Speak Test at the English as a Second Language Program on campus, or the Test of Spoken English through TOEFL testing centers. Students wishing to take the Speak Test should contact the South Student Services Center at 2258 EH to register to take the exam.
- 3) Project Assistantships: There are a few project assistant opportunities on campus. Announcements of openings are posted on the TA/PA bulletin board across from the ECE student mailboxes on the first floor and on the UW Job Center Web Page. <http://www.jobcenter.wisc.edu/>
- 4) Fellowships: Information concerning fellowships is sent to graduate students through email and is posted on the graduate student bulletin board near 2258 Engineering Hall.
- 5) Grader Positions: Students may apply one week prior to start of classes each semester. Selections are posted by the end of the first week of classes. These are paid hourly positions. Applications are available online at: <http://www.engr.wisc.edu/cmsdocuments/ECEGraderApplication.pdf>.

Grants Information Collection

The Memorial Union has a Grants Information Collection run by Nikki Busch. This library collection of print and on-line resources assists students in finding external funding, grants, scholarships and fellowships. Students may make individual appointments with Ms. Busch to customize their fellowship search. Please visit <http://grants.library.wisc.edu> for more information.

Mailboxes

All graduate students are assigned mailboxes on the first floor near Room 1422 Engineering Hall. All students should check to see if their names are listed. Students should report missing names to the staff in 2420 Engineering Hall. The mailbox names are re-organized at approximately the third week of every semester. Students should check their boxes daily for university and department information. Personal mail should be sent to home addresses. Student mailboxes will be emptied of any remaining materials cleaned after each semester.

Parking

For parking information, go to www.fpm.wisc.edu/trans.

Payroll

All funded graduate students must contact the Payroll and Benefits Specialist in 2440 Engineering Hall as soon as they arrive on campus. Many payroll and insurance forms need to be completed before students can be placed on the payroll or be covered by insurance. These benefits have early deadlines. Graduate students with at least a 33.3% appointment are eligible for university health insurance programs and tuition remission.

Student Electronics Shop

This facility, available for both ECE undergraduate and graduate student use, is located in Room 1538 Engineering Hall. It is open Monday through Friday from approximately 8:00 – 3:30 (see sign posted on door). The shop includes lab benches set up with test equipment. Those with course projects are encouraged to use this facility.

Travel

Graduate students are sometimes provided with funding by a supervising professor for travel to conferences. Before making travel arrangements, students must see the Financial Specialist in room 2438 Engineering Hall. This is necessary to eliminate the possibility of incurring unexpected expenses, which cannot be covered by university funds.

Wendt Library (<http://wendt.library.wisc.edu/>)

Wendt Library serves the College of Engineering and the Department of Computer Sciences, Statistics, and Atmospheric & Oceanic Sciences. Wendt Library staff is happy to help students, faculty, staff, and the public in their engineering research. Please visit the Reference Services site (http://wendt.library.wisc.edu/help_with_research/reference_services) for additional details.

Writing Center (<http://www.wisc.edu/writing>)

The University of Wisconsin-Madison's Writing Center serves undergraduate students, returning students, graduate students, dissertators, English as a Second Language (ESL) students, faculty, staff, and teaching assistants. Please refer to <http://www.wisc.edu/writing/AboutUs/DoForYou.html> for additional information about the Writing Center's services.

2.3.1 Policy on Sexual Harassment

Sexual harassment is a community concern. When sexual harassment occurs, it degrades the quality of work and education at the University of Wisconsin-Madison. It erodes the dignity and productivity of the individuals involved and diminishes the quality, effectiveness, and stature of the institution. It can occur in any university setting (an office, a classroom, a university program). Each of us has a collective responsibility not to harass others and to act responsibly when confronted by the issue of sexual harassment, thereby promoting an environment that better supports excellence in teaching, research, and service.

(Taken from: <http://www.oed.wisc.edu/sexualharassment/index.html>)

What is Sexual Harassment?

Unwelcome sexual advances, requests for sexual favors, and verbal or physical conduct of a sexual nature constitute sexual harassment when submission to such conduct is a condition of employment, academic progress, or participation in a university program; or submission to or rejection of such conduct influences employment, academic or university program decisions; or the conduct interferes with an employee's work or a student's academic career, or creates an intimidating, hostile or offensive work, learning, or program environment.

Key Points About Sexual Harassment

- Differences in power or status can be a significant component in sexual harassment. A person who seems to acquiesce to sexual conduct may still experience tangible action harassment or hostile environment harassment if the conduct is unwelcome.
- Harassment can occur between men and women or between members of the same gender.
- Sexual harassment may or may not involve a tangible injury (e.g., economic loss, lowered grades). A sexually harassing environment, in and of itself, may constitute a harm.
- Individuals in positions of authority are responsible for ensuring that employees, students or others do not harass. In an academic or program setting, offenders can be faculty, instructors, lecturers, teaching assistants, coaches, tutors, or fellow students or program participants.
- The person filing a sexual harassment charge does not have to be the person harassed but could be anyone significantly harmed by the harassing conduct.
- Some behavior that is not in violation of university policy may, nonetheless, be unprofessional under the circumstances. Consequences of such unprofessional behavior may include poor performance evaluations or possible discipline.

What to do if you feel you've been sexually harassed:

- Seek advice. Consult your department chair, another divisional resource person, the Office of Equity and Diversity (<http://www.oed.wisc.edu/>), or another campus resource to discuss options for resolution.
- You may choose to seek informal resolution or file a sexual harassment complaint. You may find more information on filing a complaint at <http://www.oed.wisc.edu/dishar.html>.
- For additional information, please visit: <http://www.oed.wisc.edu/sexualharassment/do.html>.

3.0 Requirements for the M.S. Degree

3.1 Residency Requirements

The M.S. degree requires at least 16 credits of graduate-level courses (300 level or above, no audits or pass-fail) taken as a graduate student at UW-Madison. ECE 702 and 790 may be applied toward partial fulfillment of this requirement. Note, however, 300-level ECE courses cannot be applied to ECE MS requirements.

3.2 Thesis Option

There are three distinct “options” or plans of study, which each student may choose in order to fulfill the requirements for the M.S. degree in Electrical and Computer Engineering. The first of these consists of a combination of course work and independent research, culminating in an M.S. thesis.

To fulfill the requirements of the Thesis Option, the student must earn 24 graduate credits, attained with acceptable grades as defined in Section 7. Of these 24 credits, at least 15 must be in ECE Courses, and at least 15 must be in courses numbered 700 or higher in ECE or in other departments. Only graduate courses, namely those courses listed or approved for listing in the Graduate School Bulletin are applicable for graduate credit, with the exceptions that 300 level ECE courses and ECE 702 are not acceptable.

Of the 24 credits, a minimum of 3 and a maximum of 6 credits must be in ECE 790 (Master’s Research or Thesis). These ECE 790 credits are applicable toward both the 15 ECE credit requirement and the 700-level requirement. The combined number of credits in ECE 790, ECE 699, and ECE 999 (Advanced Independent Study) applied toward the degree may not exceed nine. ECE 890 and 990 are not applicable to the M.S. degree.

For added flexibility, 6 credits in courses numbered 400 or higher may be used to substitute for 3 credit courses numbered 700 or higher. This may be done only once, increasing the degree requirement to 27 credits. In this case, the combined number of credits in ECE 790, 699, and 999 may not exceed six.

Each student who elects the Thesis Option is required to perform research in consultation with a faculty advisor. At the conclusion of the research program, a thesis must be prepared. The thesis must: 1) conform to Graduate School and library formats; 2) be approved by the advisor; 3) (if required by your advisor) be filed with the Memorial Library where it is catalogued and stacked for future reference; and 4) an electronic copy must be sent to Sherry at stlianto@wisc.edu.

At the conclusion of the research project, all grades of P (Progress) and I (Incomplete) in ECE 790 are changed to either S (Satisfactory) or U (Unsatisfactory) by the advisor. In the final semester the student is required to check in at the ECE Student Services Office in 2258 EH to apply for a degree warrant by the announced deadline.

3.3 Project Option

The Project Option consists of the same credit and course requirements as the Thesis Option. Under this option, the student must perform a research project in consultation with a faculty advisor. At the conclusion of the project, a report is prepared. The research project is generally more limited in scope than a thesis and typically is not awarded as many credits. The report need not conform to Graduate School and library formats, but it must be typewritten. The student's advisor must approve the report, and an electronic copy must be sent to Sherry at stlianto@wisc.edu in ECE Student Services Office. No library copy is required. In the final semester, the student is required to check in at the ECE Student Services Office in 2258 EH to apply for a degree warrant by the announced deadline.

3.4 Course Option

The Course Option consists of 30 credits of graduate level courses, as defined in Section 3.1, and attained acceptable grades as described in Section 7. Of these, at least 15 credits must be in ECE courses, at least 15 credits must be in courses numbered 700 or higher and at least 9 credits must be in ECE courses numbered 700 or higher. At most, 3 credits may be in ECE 699; at most, 3 credits may be in ECE 999. ECE 702, 790, 890, and 990 are not allowed as part of the 30 credits. Substitution of 6 lower-level credits for three 700-level credits, as in the Thesis and Project Options, is not allowed. No thesis or project is required.

The student is strongly encouraged to seek faculty guidance in designing a course program for this option. In particular, students should be aware that faculty in certain areas are unwilling to supervise Ph.D. students who have not written a Master's thesis. A student who intends to pursue a Ph.D. should check with faculty in the area in which his or her main interests lie.

In the final semester the student is required to check in with the ECE Student Services Office in 2258 EH to apply for a degree warrant by the announced deadline. Students will also want to use the M.S.E.E. Course Approval form to check credits, level and breadth requirements. This form must be completed and signed by the student's advisor and the Graduate Committee chair in order for the completion of degree. The M.S.E.E. Course Approval Form is available in room 2258 EH or online at:

<http://www.engr.wisc.edu/cmsdocuments/ECEGradMSEECourseApprovalForm.pdf>.

3.5 Seminar Requirement

All ECE graduate students must register for ECE 600 during their first two semesters in residence and follow the requirements posted for each semester. (Choose the link for ECE 600 at <http://www.engr.wisc.edu/ece/courses/ece600.html> to see the current requirements.)

If ECE 600 is not taken during the first two semesters, ECE 600 should be taken as early as possible in the student's academic career here. TAs who have teaching conflicts with the ECE 600 meeting time should contact the ECE 600 organizer about how to handle this.

The purpose of ECE 600 is to expose students in their first two semesters of graduate school to various areas within ECE and to areas outside of ECE to which ECE has or could have connections, e.g., biotechnology, physics, mathematics, business, software. Electrical and Computer Engineering is very interdisciplinary in nature, and so it is important that students be aware of state-of-the-art in research areas other than their own.

3.6 Fundamentals Requirement

Graduate students seeking an M.S. degree in Electrical and Computer Engineering are responsible for demonstrating proficiency in four out of the following five areas of undergraduate study: Electrodynamics, Circuit Analysis, Signals and Systems, Electronics, and Digital Systems. The courses ECE 220, ECE 230, ECE 330, ECE 340, and ECE 352 cover the required material in each of these areas, respectively.

Students whose undergraduate transcripts do not show proficiency in at least four of these areas may be required to pass one or more of these courses at UW-Madison with grades of B or better before receiving their M.S. degree. As an option, students may show proficiency of these required courses if they take and pass the corresponding parts of the Fundamentals Exam.

Fundamentals Exam

The M.S. Fundamentals Examination is administered on a Saturday morning about halfway through each of the Fall and Spring semesters. The exam is composed of five separate parts, each consisting of two problems related to a single course. Each student is allowed to take any of the five parts he or she chooses during the first and second semesters of graduate study. Different parts may be taken in different semesters; any part may be attempted in both semesters. Copies of past examinations are available from the Student Services staff in 2258 Engineering Hall when students sign up to take the exam. Lists of textbooks currently used in the five courses are posted on the second floor undergraduate bulletin board outside Room 2421.

A student who has twice either failed or not attempted the part of the exam corresponding to that course, and needs to show proficiency in that area to complete the four-out-of-five-area requirement, must take the course at UW-Madison and receive at least a B prior to graduation. Taking the same course more than once is permitted. For added flexibility, the student may choose to substitute ECE 320 for ECE 220, or ECE 335 for ECE 340, or both.

Certain students may delay taking the Fundamentals Examination:

- 1) Part-time students carrying fewer than 6 credits may take the exam in their second and third semesters of study.
- 2) Senior-Graduate Students may defer taking the exam until the first semester in which they are full-time graduate students.
- 3) Special Students need not take the exam until they are admitted as degree candidates.

3.7 English Competency for Non-Native English Speakers

Effective written and oral communication is vital for a successful academic career. International students whose native language is not English will be required to take the English as a Second Language Assessment Test (ESLAT), offered by the English as a Second Language (ESL) Program.

The ESLAT must be taken as soon as the student arrives at the university. The test is offered in the Fall and Spring during the week before the beginning of instruction. For more information, see the ESL home page at <http://www.english.wisc.edu/esl/eslat-exam.html>.

Based on ESLAT performance, specific ESL courses may be recommended. These courses **must** be taken and passed within 12 months of the ESLAT. Otherwise, the student will not be permitted to register during the third semester after entering the graduate program. Any ESL courses numbered 300 or above can be counted towards graduate degree requirements. Completion of ESLAT and recommended remedial courses are also a requirement for graduation of an international student whose native language is not English.

Exceptions:

Students are exempt if:

- English is the exclusive language of instruction at the undergraduate institution; or
- they have earned a degree from a regionally accredited U.S. college or university not more than five years prior to the anticipated semester of enrollment; or
- they have completed at least two full-time semesters of graded course work, exclusive of ESL courses, in a U.S. college or university, or at an institution outside the U.S. where English is the exclusive language of instruction, not more than five years prior to the anticipated semester of enrollment.

4.0 Credit Courses at a Distance (CCD) MS Degree

4.1 Requirements

Off-campus students seeking an MS degree in electrical engineering must meet all general MS degree requirements. Students may work on the thesis or project while off campus, but must keep in contact with their advisor. For more information, students should contact:

Helene Demont

<http://distancedegrees.engr.wisc.edu/MSEE/index.lasso>

Engineering Professional Development

733 Extension Building | 432 N. Lake St. | 608.262.5516 | demont@engr.wisc.edu

4.2 Program Requirements

Please refer to section 3.0 of the Graduate Handbook for an explanation of the program requirements. CCD students and on-campus students must meet the same degree requirements.

4.3 Advising for Off-Campus Students

Academic advisors must be established by the time students have completed six credits. Students are required to submit a graduate study plan to their academic advisors no later than that point in their graduate programs. If a student is pursuing either the Thesis or Project graduate program option, then it is also necessary for the student to find a research supervisor who is typically the same faculty member as their academic advisor.

4.4 On-Campus Intersession Course Requirement

A minimum of one three-week, on-campus intersession course in ECE must be taken **with any of the graduate program options (i.e., Thesis, Project, or All Course)**.

4.5 Seminar Requirement

Students may fulfill the ECE seminar requirement (see ECE 600) through equivalent substitutions, upon recommendation by the student's academic advisor and approval by the Graduate Committee.

4.6 Fundamentals Requirement

All CCD students must fulfill the ECE Fundamentals requirement (see above, section 3.6). Please contact the Student Services Office at 608-890-2420 with any questions.

5.0 Requirements for the Ph.D. Degree

5.1 Residence Requirement

The Ph.D. degree requires at least 32 credits of graduate level courses (300-level or above, no audits or pass-fail) taken as a graduate student at UW-Madison (refer to the Graduate School Catalog). ECE 702, 890, and 990 may be applied toward partial fulfillment of this requirement. At least one course must be taken at UW-Madison that is graded on the A-F scale.

5.2 ECE Course Requirements

There are two ECE course requirements for the Ph.D. degree.

The Primary Area Course Requirements¹ consists of a list of University of Wisconsin Courses specified by each of the eight graduate research areas (see Section 6 for details). These courses must be taken in the same specialty area that the student declares when registering for the Ph.D. Qualifying Examination. After the student takes the Qualifying Exam and achieves Advance Graduate Standing, a different specialty area may be chosen only with the approval of the ECE Graduate Committee. A grade point average of 3.3 or greater over all courses used to satisfy the primary area must be achieved. A special primary area course program tailored for a student whose interests do not lie within a single area requires approval by the student's advisor and the Graduate Committee at least one year before the Preliminary Examination. Research and independent study courses cannot be used to satisfy this requirement. The Primary Area Course Approval form is available in Room 2258 Engineering Hall or online at:
<http://www.engr.wisc.edu/cmsdocuments/ECEGradPhDPrimaryAreaCourseApprovalForm.pdf>.

The **Secondary Area Course Requirement** consists of a minimum of six credits² of University of Wisconsin ECE courses numbered 700 or higher not listed as part of the student's Primary Area Course Requirement (even if listed in another area) or in satisfying the student's minor program. No research courses can be used to satisfy this requirement. ECE 702 may not be used for this purpose. These six credits must be achieved with a grade point average of 3.25 or greater. These six credits can be substituted with other graduate-level coursework if approved by the student's advisor and the graduate committee following submission of a coherent course plan that justifies the substitution. A minimum of 18 graduate level credits is required beyond the minor (see below). The Secondary Area Course Approval form is available in Room 2258 Engineering Hall or online at:
<http://www.engr.wisc.edu/cmsdocuments/ECEGradPhDSecondaryAreaCourseApprovalForm.pdf>.

5.3 Minor Requirement

Supplementary to the major ECE field of study, each Ph.D. candidate is required to pursue a minor in some other Regent-approved degree program(s). Typical minor fields for ECE students are non-ECE Engineering disciplines, Computer Science, Mathematics, Physics, Physiology, and Statistics.

¹ Courses used to satisfy this requirement may not be used to satisfy other Ph.D. course requirements.

² Note that it is not required that all 6 credits be in the same area to satisfy this requirement.

The minor, whether in a single department (Option A) or distributed in two or more departments including ECE (Option B), is designed to represent a coherent body of work, and should not simply involve an after-the-fact ratification of a number of courses. Upon completion of all minor courses, a copy of the approved Minor Agreement Form must be placed on file with the Student Services staff in Room 2258 Engineering Hall.

To satisfy Option A, a student must earn at least nine credits from a single degree program outside the ECE Department and satisfy the requirements of the minor department³. Approval of the courses for the Option A minor is certified by the minor department. A course cross-listed with the ECE Department may be used for the minor only if the course is staffed by the minor department; at most one such course may be used, and this course cannot be applied to any other Ph.D. requirement of the ECE Department.

To satisfy Option B, a student must earn at least 10 graduate credits in two or more departments, and can include ECE course work not used for any other Ph.D. course requirement. A planned program, approved by the student's advisor, must be submitted to the designated ECE Graduate Committee representative for approval. Three credits must be numbered 700 or higher in each of at least two of the Option B departments. The Option B minor form may only be submitted to the student's department file after all approved courses are satisfactorily completed.

Approval forms for the Minor Requirement are available in Room 2258 Engineering hall or online at: <http://www.engr.wisc.edu/cmsdocuments/ECEGradPhDMinorApporvalForm.pdf>.

5.4 Seminar Requirement

Two semesters of ECE 600 are required, unless the Seminar Requirement for the M.S. degree has already been fulfilled. See Section 3.5 for details.

5.4.1 Getting an ECE MS Along the Way

Students initially admitted to the ECE Ph.D. program who then decide to get an ECE MS must meet the Fundamentals Requirement (see Section 3.6). However, they are allowed to make two attempts at the Fundamentals Exam at any time; the attempts need not be restricted to their first or second semesters of study.

5.4.2 Getting a Master's Degree in Another Department Along the Way

Courses taken in a minor department for the ECE minor requirement may be used toward a master's degree in the minor department if the ECE and the minor departments agree.

5.5 Ph.D. Qualifying Examination

All students intending to pursue a Ph.D. are required to take the Ph.D. Qualifying Examination. A student must complete at least one semester of full-time graduate course work before taking the examination. All graduate students must take the examination no later than the fourth semester after admission to the ECE Graduate Program (summers not included). If a second attempt is required, it must occur no later than the fifth semester after admission. If a student leaves the department (e.g. to work between M.S. and Ph.D. degrees), the time spent away from study will not count as part of the four semesters. In addition, one extra semester will be allotted for every two semesters the student is away, leaving the student with at most four semesters after

³ The minor department may require more than 10 credits - many require 12 credits. Check with the minor department before taking courses.

returning to take the exam the first time. These rules apply to every graduate student, including those who initially pursue an M.S. degree. The qualifying Examination is given twice a year, during the fall and spring semesters.

The Qualifying Examination is a general examination that places emphasis on a student's ability to reason, formulate, and solve problems, and apply basic engineering and analytical skills. Special emphasis is placed on problem solving relative to the student's area of specialization.

Seven ECE professors, selected by the Graduate Committee, examine students. Three examiners are chosen from the student's area, and four examiners are chosen randomly from the remaining areas. Outside area qualifying examinations are offered as needed with the committee drawn from those professors listed in this handbook. The primary area exam may contain both a written and oral portion, and be of varying length.

Because part of the test may be oral, students who have difficulty conversing in English are advised to take the necessary steps toward improvement in spoken English prior to taking the Qualifying Examination.

The detailed structure of the Ph.D. Qualifying Examination is as follows:

- 1) Upon registration for the exam, the Graduate Committee selects seven examiners for each student as follows.
 - a) First, three faculty are chosen from the student's specialty area. Specialty areas are listed in Section 6.
 - b) Next, four faculty are chosen randomly from those faculty who are not part of the student's primary area. The selection process is carried out in such a way that there are no duplications of the three faculty chosen in part (a) and there are no duplications of faculty or areas among the non-specialty examiners.
- 2) Students must contact the examiners and arrange convenient times for taking the various parts of the exam.
- 3) The entire exam is held within a two-week period designated by the Graduate Committee. The examination period is announced at the beginning of each semester.
- 4) Each professor administers the non-specialty parts of the exam separately. Each part consists of a 30-45 minute oral or written test covering material that the examiner feels is appropriate for measuring the student's ability to succeed as a Ph.D. student and researcher.
- 5) The format for the portion of the exam administered by faculty in the student's area varies considerably from one area to another. It may consist of three separate parts, similar to #4) above. On the other hand, it may consist of a single oral or written test administered by the three area faculty jointly. Any combination of the two is also possible. The student is informed of the exact format when he or she schedules the exam as indicated in #2) above. Some areas assume students have taken certain courses. Students should find out about this when they first arrive on campus so they have time to take these courses before the qualifying exam.

- 6) Each of the seven faculty members independently grades his or her part of the exam, turning in a grade of either PASS, MARGINAL, or FAIL. Note: the student does not learn the results of his or her exam. Faculty should not inform the student of his or her grade, and the student should not ask.
- 7) Grades are tabulated for each student at the end of the examination period and are forwarded to the Graduate Committee. The grades become part of the student's case for Advanced Graduate Standing.
- 8) No student may take the exam more than twice.

5.6 Advanced Graduate Standing (AGS)

AGS is the departmental designation for official permission to pursue a Ph.D. degree. The Graduate Committee grants AGS. The process of evaluation for AGS is based on: 1) the student's performance on the Ph.D. Qualifying Examination; 2) performance in graduate courses; and 3) letter of recommendation from the student's research advisor. Any additional supporting material (such as publications) the student wishes to provide is also welcome. With regard to condition 2), although a grade point average of 3.3 is the minimum requirement for satisfaction of the Primary Area and Secondary Area Course Requirements, a substantially higher overall GPA in graduate course work is usually required before AGS is granted.

Each student is automatically evaluated for AGS after taking the Ph.D. Qualifying Examination. Notification of the outcome of the review is made by e-mail. If a student is turned down at the first AGS review, he or she is notified of the reasons with an indication of how and to what extent the student's chances of receiving AGS in the future can be improved. Typically, such a student is required to retake the Qualifying Exam. No student is reviewed for AGS more than twice. A student who is turned down for AGS a second time is dropped from the Ph.D. program.

5.7 English Competency Requirement

Non-native speakers of English who enroll in the Ph.D. program must take the ESLAT test on arrival at the university and then take any recommended courses. In addition, if a student's advisor believes that his or her technical writing ability needs improvement, the student may be required to undertake remedial work. See Section 3.7.

5.8 Preliminary Examination

Every Ph.D. student is required to pass the Preliminary Examination. Before taking the Preliminary Exam, the student must first achieve Advanced Graduate Standing (AGS) and satisfy the English Competency Requirement. All Incomplete (I) grades must be cleared prior to requesting the Preliminary Warrant. Grades of Progress (P) in ECE 890 are acceptable. After completion of the preliminary exam, the ECE 890 grade must be cleared, and the student should register for ECE 990 in future semesters.

The Preliminary Examination is a detailed examination covering the proposed research leading to the Ph.D. thesis. The purpose of the exam is to ascertain the capability of the student to perform the proposed research, and the quality and appropriateness of the project. The examination is generally oral, and is administered by a committee convened by the student with the approval of the student's research advisor. The committee consists of no less than three (but preferably five)

members, at least two of which must be selected from the ECE Department⁴. Some minor departments require that a representative from their department serve on the committee.

It is the student's responsibility to request a copy of the Preliminary Examination Warrant from the Student Services staff, at least four weeks prior to the date of the examination. The ECE Staff should be kept apprised of any changes in scheduling of room or time of the exam. There is no limit to the number of times a student may take the Preliminary Examination.

5.9 Dissertator Status

As soon as a student has passed all the requirements for the Ph.D. degree (except completion of the dissertation), the student is classified as a Dissertator. Specifically, the student must:

- 1) Take the Ph.D. Qualifying Examination;
- 2) Be awarded Advanced Graduate Standing;
- 3) Have completed 32 graduate credits taken at UW-Madison;
- 4) Satisfy the Primary Area Course Requirement;
- 5) Satisfy the Secondary Area Course Requirement;
- 6) Satisfy the Minor Requirement;
- 7) Satisfy the English Competency Requirement;
- 8) Satisfy the ECE 600 Seminar Requirement;
- 9) Pass the Preliminary Examination.

A Dissertator must be continuously registered for three credits each semester (including the summer sessions) until the Ph.D. is obtained. Ordinarily, a Dissertator registers for ECE 990, Research or Thesis. Registration must be maintained every semester, regardless of whether the student is performing research on or off campus. In addition, Dissertators who are Research Assistants or who are using university facilities must also register for summer sessions. Failure to satisfy the continuous registration requirement results in loss of Dissertator status. All the requirements for dissertator status must be completed by the Friday before the first day of classes for the semester in which the student first registers as a Dissertator.

5.10 Final Oral Examination

An oral examination is required in defense of the completed Ph.D. thesis. The examination is administered by a committee appointed by the Dean of the Graduate School, upon recommendation by the student's research advisor. The committee must consist of five or more members of the graduate faculty⁵ and is chaired by the student's advisor. At least one and no more than three members must be chosen from outside the ECE Department.

The Final Examination cannot be taken until all other requirements for the Ph.D. have been satisfied. The student's record must be cleared of all Incomplete grades. Students must request the Final Examination Warrant from the Student Services Office, Room 2258 Engineering Hall, at least three weeks prior to the date of the examination. The Student Services office must be notified of the student's examination date and time AT LEAST one week prior to the examination. There is no limit to the number of times a student may take the Final Oral Examination.

⁴ The graduate school does not monitor prelim committees, but does restrict degree committees. See the footnote under [Final Oral Examination](#).

⁵ Academic staff may serve as one of the five members. An emeritus professor may serve as one of the five members within one year of retirement. If an emeritus professor has been retired more than one year but less than two years, the chair of the committee (advisor) can request (with an explanation) that the graduate school allow the emeritus professor to serve as one of the five members. Otherwise, the graduate school will probably suggest that the emeritus professor serve as a sixth member of the committee.

6.0 Ph.D. Primary Area Course Requirement

The eight areas within the ECE Department have established the following Primary Area Course Requirements for their Ph.D. students:

6.1 Automatic Control Systems

Professors: Barmish, Cobb, DeMarco, Lesieutre, Sethares

Requirement: ECE 717, 817, 821, at least six credits from list (1), and at least 3 credits from list (2).

(1) ECE 417, 719, 739 or 780, 777, 818, 903, Math 521

(2) ECE 720, 730, Math 831

6.2 Biomedical Engineering

Professors: Blick, Hagness, Hu, Jiang, Milenkovic, Nowak, Shohet, Tompkins, Van Veen, van der Weide

Requirement: ECE 462, 463, 762, 763, and Physiology 335.

6.3 Communications and Signal Processing

Professors: Boston, Bucklew, Draper, Gubner, Hu, Milenkovic, Nowak, Sayeed, Sethares, Van Veen

Requirement: ECE 729, 730, 735, 830, Math 521, and at least three credits selected from the following list: ECE 532, 533, 537, 539, 641, 720, 732, 734, 736, 738, 842, and 901.

6.4 Computer Engineering

Professors: Bach, Banerjee, Boston, Compton, Davoodi, Hill, Hu, Kim, Lipasti, Ramanathan, Saluja, Sohi, Wood

Requirement: At least eighteen credits selected from the following list: ECE 453, 468, 537, 551, 552, 553, 554, 555, 556, 707, 750, 751, 752, 753, 754, 755, 756, 757, and 902. The selected courses must include 552 and at least one of 453, 468, and 554; at least two of the courses must be numbered 700-902. A student may be exempted from up to six credits of this requirement by use of: 1) equivalent courses taken as an undergraduate student; 2) equivalent courses taken as a graduate student elsewhere; or 3) other relevant courses not listed. Exemptions must be approved by the student's advisor. Courses used for exemption may not be used to satisfy other Ph.D. degree requirements such as the Secondary Area Course Requirement or the Minor Requirement. Exemption may not be used to satisfy the requirement for two courses at the 700-902 level.

6.5 Electromagnetic Fields and Waves

Professors: Anderson, Behdad, Booske, Hagness, Hitchon, Shohet, van der Weide, Wendt

Requirement: At least twelve credits selected from the following list: ECE 545, 547, 740, 742, 744, 748, 749, 841, 843, 848, and 906. No more than two semesters of ECE 906 can be used to fulfill this requirement. ECE 740 is considered to be the core course for this area and is strongly recommended.

6.6 Energy and Power Systems

Professors: DeMarco, Fredette, Han, Jahns, Lesieutre, Venkataramanan

Requirement: ECE 411, 412, 427 (or equivalents—these courses are often taken by students as part of their undergraduate curriculum), 12 credits, with a minimum of 9 credits in courses numbered 700 or above, selected from the following list, consistent with the student's focus of research and approved by the student's academic advisor: ECE 504, ECE 512, ECE 511, ECE 711, ECE 712, ECE 713, ECE 714, ECE 723, ECE 731, ECE 733.

Students with strong interdisciplinary interests (e.g.,: control, reliability, materials, optimization techniques, numerical methods, electro-magnetics, energy policy, thermal issues, electric transportation, wind energy) may take up to a maximum of 6 credits in a related area upon approval by their academic adviser. Note: ECE 512 and ECE 733 are not regularly scheduled.

6.7 Plasmas and Controlled Fusion

Professors: Anderson, Hitchon, Shohet, Wendt

Requirement: ECE 525, and three credits selected from the following list: NEEP 526, ECE 527, or ECE 528, and at least one of the following courses: ECE 724, 725, 726, 748, 848, and 908.

6.8 Solid State Electronics and Photonics

Professors: Blick, Botez, Hagness, Hitchon, Jiang, Knezevic, Ma, Mawst, McCaughan, Sanders, van der Weide

Requirement: At least 18 credits selected from the following list: ECE 434, 445, 466, 535, 536, 541, 542, 543, 544, 548, 549, 601, 602, 741, 743, 745, 746, 845, 904, 913. Of these, at least 6 credits must be earned in courses level 500-602 (of which no more than 3 credits can be earned in 601 and 602 combined, and only for special topics within the SSEP area, at the discretion of the student's advisor), and at least 9 credits must be earned in courses level 700-913.

7.0 Criteria for Grade Acceptability for Advanced Degrees

- 1) A grade of B or better in any graduate course is acceptable. A grade of S in ECE 790, 890 and 990 is acceptable.
- 2) A grade of BC in an ECE classroom course is acceptable, provided the total cumulative GPA for graduate ECE classroom courses is greater than or equal to 3.00.
- 3) A grade of C or lower in an ECE classroom course is not acceptable.
- 4) A grade of BC or lower in an independent study course (ECE 699 or ECE 999) or a grade of U in Research or Thesis (ECE 790, 890 or 990) is not acceptable.
- 5) A grade of BC or C in a non-ECE course is acceptable only if approved by the Graduate Committee. As a pre-condition for approval, this grade must be offset by grades of AB or A.
- 6) If students are unable to complete course work by the end of the term, an instructor may enter a temporary grade of I for incomplete. If students have not resolved all incompletes by the end of the next fall or spring term in which they are enrolled, they are considered in bad standing by the Graduate School; however, the instructor may impose an earlier deadline. If not resolved within this time period, the grade is considered unsatisfactory and will remain an I unless changed to a final grade by the instructor. An unresolved I grade lapses to a grade of PI after five years. Students may be placed on probation or suspended from the Graduate School for failing to complete the work and receive a final grade in a timely fashion. Outstanding incompletes must be resolved before a degree is granted.

8.0 Recommended Progress Toward Advanced Degrees

Permission for an M.S. or Ph.D. student in Electrical and Computer Engineering to continue in the Graduate School is contingent upon progress toward a degree at a rate that is satisfactory to the Department of Electrical and Computer Engineering. These regulations apply to all graduate students, with or without appointments. Part-time students may make progress at a slower rate; their rate of progress is evaluated on a case-by-case basis.

A full-time student who meets the requirements listed below, within the time intervals indicated, is deemed to be making satisfactory progress toward the M.S. or Ph.D. degree. A full-time student who fails to meet these requirements may be denied permission to continue in the Graduate School. The ECE Graduate Committee may permit departures from this schedule upon recommendation of the student's major professor.

The following list summarizes acceptable progress for a graduate student entering with only a B.S. degree and pursuing both an M.S. and a Ph.D. Appropriate modifications should be made for students either entering with an M.S., or pursuing just an M.S. or Ph.D. The following guidelines should not be interpreted as a Schedule of Classes for the average student; most students find it practical and desirable to progress more rapidly than is outlined here.

- 1) **1st calendar year of study:** (12 consecutive months): Take ESLAT if required and take recommended course, if any. Complete 18 credits of advisor-approved graduate courses with a grade of B or better in each course. A grade of BC is also admissible if it is obtained in a course other than ECE 790, 890, or Advanced Independent Study and the student maintains at least a 3.0 ECE grade point average. Take the Fundamentals Exam (if required).
- 2) **2nd calendar year of study:** Complete 18 graduate credits with acceptable grades. Complete the M.S. degree. Achieve Advanced Graduate Standing.
- 3) **3rd calendar year of study:** Complete 18 graduate credits with acceptable grades. Satisfy the ECE Course Requirements.
- 4) **4th calendar year of study:** Complete 18 graduate credits with acceptable grades. Satisfy the Minor Requirement. Pass the Preliminary Exam.
- 5) **Additional Study:** Enroll as a dissertator for a minimum of three graduate credits each semester and summer session, and continue Ph.D. thesis research.

Each semester the Graduate Committee reviews the progress of all Ph.D. students who have not completed their degree requirements after five years of study. Permission to continue in the Graduate School may be denied if the Graduate Committee determines that it is unlikely that the student can finish the Ph.D. degree in a reasonable period of additional study.

9.0 Academic Probation

Students with marginal or questionable undergraduate records are sometimes admitted on probation. A student is placed on probation at the end of any semester or summer session in which his or her graduate cumulative grade point average falls below 3.0. Removal from probation takes place when the cumulative grade point average becomes 3.0 or better.

A student who is on probation must take a full load of graduate courses unless explicitly authorized to do otherwise by the Graduate Committee Chair. A full load during a semester is defined to be at least 8 credits. During a summer, a full load consists of 5 credits, if classroom courses are taken. A student on probation may take fewer than 5 credits during a summer, if only ECE 790, 890, and/or ECE 999 are taken.

While on probation, a Ph.D. student is not eligible to take the Preliminary Examination or the Final Oral Examination. Unusual situations can be handled by appeal to the Graduate Committee Chair. Any student while on probation must earn a grade point average of 3.0 or better every semester or summer session. The Graduate Committee will recommend to the Graduate School that any student who is on probation and obtains a grade point average of less than 3.0 during a semester or summer be dropped from the Graduate School.

ECE 790 or 890 is not considered for the purpose of probation determination. ECE 699 or 999 (Advanced Independent Study) is considered for probation determination only if a grade of BC or lower is attained in that course.

For probation determination, grades of I (Incomplete) are ignored the semester they are issued. However, if the I is not removed during the next semester in residence, it is counted as a C for all subsequent probation determination calculations until the course is completed, unless authorization to further defer completion of the course is obtained from the Graduate Committee. A grade eventually obtained to replace an I is counted as earned during the semester when the I is removed.

Audit courses may not be used to satisfy the full load requirement of probationary students. Students cannot graduate while on probation.

10.0 Enrollment Requirements, TA and RA Appointments

All students using University facilities must be enrolled according to Graduate School regulations. In addition, there are maximum and minimum enrollment restrictions on Teaching and Research Assistants. Students who have 33.3% to 50% appointments must be enrolled as full-time graduate students in spring and fall and at least 2 credits in summer if RA or fellow. Full-time status requires taking no less than 8 and no more than 12 credits during the fall and spring semesters, unless dissertator status has been achieved. The Graduate School has no summer enrollment requirement for TAs, but individual programs may, so students should contact their academic program if they are TAs in a different program. Pas must enroll for two credits.

Deviation from these enrollment limits requires approval by the Department Chair or Graduate Committee Chair and/or TA coordinator if TA position involved. For other appointment levels, consult with the Student Services staff person in 2258 Engineering Hall.

For information regarding teaching assistant positions, students should complete the application available online at: <http://www.engr.wisc.edu/cmsdocuments/ECE-TA-grader-application.pdf>. For information regarding availability of research assistantships, students should contact professors individually.

11.0 Part-Time Study

Students who are employed full-time elsewhere may elect to pursue a graduate degree on a part-time basis. For these students the timing indicated in certain sections of this booklet may be relaxed on an individual basis by Graduate Committee action. Specific rules of concern are those having to do with minimum progress, the Fundamentals Requirement, and Probation.

Part-time International students should be aware of potential restrictions imposed upon them by their visas and should contact the International Students Services Office.

12.0 Special Student Status

Students enrolled as special students (university special students) are considered non-degree candidates and pay fees at a lower rate than graduate students. No currently enrolled graduate degree candidate may enroll as a special student. Prior to beginning a graduate program, an international student may enroll for English 110, 114, 115, 116, 117, 118, 122, 326, 327, 328, 333, and 334 as a special student. Graduate-level work done as a special student prior to enrolling in the Graduate School cannot be counted toward the Graduate School's minimum credit requirement and will not be included in the calculation of the graduate GPA. However, a department/program may wish to count these credits toward department/program course requirements or, in rare circumstances, appeal to the Graduate School to transfer credits to meet the minimum credit requirements for a graduate degree provided the work was not done to prove admissibility to the Graduate School. If the appeal is approved, the Graduate School notifies the Office of the Registrar. For the credits transferred for each semester, you will be charged a differential equal to the semester's graduate fees.

13.0 Research Courses and Independent Study Courses

Three types of thesis or research courses exist, and are variable credit courses (1-12 credits):

790: Master's Research or Thesis

890: Pre-Dissertator's Research

990: Research or Thesis (requires dissertator status)

Students are responsible for properly registering for the research course that matches their status in the graduate program for each particular semester. For example, master's degree candidates pursuing the thesis or project option must stay registered in ECE 790 through the semester/session in which they are awarded the degree. If pursuing research in the semester immediately after an M.S. degree is awarded, a student should then register for ECE 890. Research courses are sometimes confused with independent study courses (ECE 699, 999) for registration purposes. If you are pursuing research that leads to a project report or thesis, ECE 790, 890, or 990 is appropriate. If you are studying material that is not offered as a regular classroom course, or need to study a topic area to aid you in pursuing your thesis research, then ECE 699 or 999 is appropriate. ECE 699, 790, 890, 990, and 999 are all authorization courses that require department approval before registration. Forms are available in room 2258 Engineering Hall and online at:

<http://www.engr.wisc.edu/cmsdocuments/ECE699-999EnrollmentAuthorizationForm.pdf>.

Complete and return as noted before registering.

13.1.a. Transferring Graduate Credits Taken at Other Universities

The graduate committee handles course transfer requests on a case-by-case basis. Students should make requests in writing on the form available in Room 2258 Engineering Hall or online at: <http://www.engr.wisc.edu/cmsdocuments/ECEGradCreditTransferRequest.pdf>. Information required includes a copy of the transcript showing the course which was taken, an official syllabus, and a copy of the official catalog description for each course for which a transfer is requested, and the name and number of the UW-Madison course the student feels is equivalent. The student must also state for which requirement the transferred course will be used. Although transferred credits may count toward various specific course requirements, they do **NOT** count toward the minimum number of graduate credits which must be taken at UW-Madison (see Section 13.1.b below).

13.1.b. UW-Madison Minimum Credit Requirement of the Graduate School.

Normally, this requirement is automatically satisfied by M.S. and Ph.D. students who do their entire graduate work at UW-Madison. However, it can be a problem if you transfer credits as in Section 11a or if you use courses taken as a special student to meet ECE Department course requirements.

M.S. Degree: You must take at least 16 credits at the 300-level or above (not including audits or pass-fail) as a graduate student at UW-Madison. ECE 790 may be applied toward partial fulfillment of this requirement. At least one course must be taken that is graded on the A-F scale.

Ph.D. Degree: You must take at least 32 credits at the 300-level or above (not including audits or pass-fail) as a graduate student at UW-Madison. ECE 890 and 990 may be applied toward partial fulfillment of this requirement. At least one course must be taken that is graded on the A-F scale.