ELECTRICAL ENGINEERING, PH.D.

The E C E department offers graduate studies leading to a doctor of philosophy degree. The doctorate is a research degree emphasizing creativity and original approaches to problem-solving in electrical and computer engineering.

A student who is admitted to the Ph.D. program must pass the Ph.D. Qualifier Examination (QII), usually in the fourth semester, and achieve Advanced Graduate Standing (AGS) by the E C E Department Graduate Committee. Students must satisfy the UW–Madison Graduate School (http://www.wisc.edu/grad) credit requirement, and pursue a major, secondary, and minor field of study in consultation with a faculty advisor.

The doctoral program involves a study phase with course requirements in the student's major area of study, describing the proposed dissertation research, and culminating in the presentation and oral defense of an original research thesis. Typical minor programs draw upon the expertise of mechanical engineering, computer sciences, math, and physics.

In order to be awarded a Ph.D. degree in Electrical Engineering, students must adhere to department and Graduate School policies and requirements. Please refer to the Graduate Student Handbook for more information.

There are opportunities for research at both M.S. and Ph.D. levels.

ADMISSIONS

An applicant must have a bachelor’s degree from a regionally accredited U.S. institution or a comparable degree from an international institution. International applicants can find specific information for their country on the Graduate School Admission Requirements (http://grad.wisc.edu/admissions/requirements) page. The department welcomes applications from scientific, engineering, and mathematical disciplines other than E C E.

Admission Requirements:

• A grade point average of 3.0 (4.0 basis) is the minimum requirement for admission consideration. Applicants from an international institution must demonstrate strong academic achievement comparable to a 3.0. The Graduate School will use your institution's grading scale. Please do not convert your grades to a 4.0 scale.

• A submitted online application is required, consisting of:
  • your resume/CV;
  • a statement of purpose (see the guidelines (https://grad.wisc.edu/apply/prepare) provided by the Graduate School);
  • an uploaded transcript; and
  • payment of the one-time application fee of $75.
  • This fee is nonrefundable. It can be paid by credit card (MasterCard or Visa) or debit/ATM card. By Wisconsin state law, this fee can only be waived or deferred through the conditions outlined by the Graduate School (https://grad.wisc.edu/apply/fee-grant).

• Applicants must also obtain three letters of recommendation for consideration.

• Graduate Record Exam (GRE) general test scores are required for all applicants. Please send your scores electronically via ETS to institution code 1846. UW undergraduate students, specifically those who have a B.S. degree in electrical engineering or computer engineering, may be exempt from the GRE requirement. Please inquire with the E C E Graduate Admissions Team at ecegradadmission@engr.wisc.edu.

• Applicants whose native language is not English must provide an English proficiency score. There are a few situations in which applicants are exempt from this requirement. Please see the Graduate School's English Proficiency Requirement (https://grad.wisc.edu/apply/requirements), which also lists the exemptions and required method of delivery.

The application deadline for fall is December 15 of the year prior to starting the program (example: December 15, 2018, for fall 2019). There are no spring or summer admission cycles. Only completed applications, including supportive materials, by the application deadline are guaranteed consideration. Please note that it is highly advised to take the GRE and TOEFL/IELTS tests well in advance of the deadline to ensure time for receiving and processing the scores.

If you have any admissions questions, please contact the E C E Graduate Admissions team at ecegradadmission@engr.wisc.edu.

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding) is available from the Graduate School. Be sure to check with your program for individual policies and processes related to funding.

FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding) is available from the Graduate School. Be sure to check with your program for individual policies and processes related to funding.

PROGRAM RESOURCES

FINANCIAL SUPPORT

Research Assistantships

Students should contact professors in their area of interest. Professors decide whom they will appoint on their research grants.

Teaching Assistantships

Current graduate students may apply to teaching assistantship or hourly grader positions at the E C E TA/grader portal (https://apps.aims.wisc.edu/tagrader/default.aspx). Non-native English speakers are required to pass the SPEAK Test (https://esl.wisc.edu/ita-training/speak) at the English as a Second Language Program on campus. Students wishing to take the SPEAK Test should contact the E C E TA Coordinator via email to register for the exam.

Project Assistantships

There are a few project assistant opportunities on campus. Announcements of openings are posted on TA/PA bulletin boards.
in Engineering Hall and on the UW Job Center website (http://www.jobcenter.wisc.edu).

**Fellowships**
Information concerning fellowships is sent to graduate students through email from the department, faculty, and/or the Graduate School.

**Grader Positions**
Current graduate students may apply to teaching assistantship or hourly grader positions at the ECE TA/grader portal (https://www.aims.wisc.edu/tagrader/Default.aspx.html).

### MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/policiesandrequirements#text), in addition to the program requirements listed below.

### MAJOR REQUIREMENTS

**MODE OF INSTRUCTION**

<table>
<thead>
<tr>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**Mode of Instruction Definitions**

- **Evening/Weekend:** These programs are offered in an evening and/or weekend format to accommodate working schedules. Enjoy the advantages of on-campus courses and personal connections, while keeping your day job. For more information about the meeting schedule of a specific program, contact the program.

- **Online:** These programs are offered primarily online. Many available online programs can be completed almost entirely online with all online programs offering at least 50 percent or more of the program work online. Some online programs have an on-campus component that is often designed to accommodate working schedules. Take advantage of the convenience of online learning while participating in a rich, interactive learning environment. For more information about the online nature of a specific program, contact the program.

- **Hybrid:** These programs have innovative curricula that combine on-campus and online formats. Most hybrid programs are completed on-campus with a partial or completely online semester. For more information about the hybrid schedule of a specific program, contact the program.

- **Accelerated:** These on-campus programs are offered in an accelerated format that allows you to complete your program in a condensed time-frame. Enjoy the advantages of on-campus courses with minimal disruption to your career. For more information about the accelerated nature of a specific program, contact the program.

### CURRICULAR REQUIREMENTS

**Minimum** 51 credits

<table>
<thead>
<tr>
<th>Credit Requirement</th>
<th>Minimum 32 credits</th>
</tr>
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</table>

**Residence Credit Requirement**

Half of degree coursework (26 credits out of 51 total credits) must be completed graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university’s Course Guide.

- **Overall Graduate GPA Requirement:** 3.00 GPA required.

- **Other Grade Requirements:**
  1. A grade of B or better in any graduate course is acceptable. A grade of S in ECE 790 Master’s Research or Thesis, ECE 890 Pre-Dissertator’s Research and ECE 990 Research or Thesis is acceptable.
  2. A grade of BC in an ECE course is acceptable, provided the total cumulative GPA for graduate ECE courses is greater than or equal to 3.00.
  3. A grade of C or lower in an ECE course is not acceptable.
  4. A grade of BC or lower in an independent study course (ECE 699 Advanced Independent Study or ECE 999 Advanced Independent Study) or a grade of U in Research or Thesis (ECE 790, ECE 890 or ECE 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.
  6. If students are unable to complete coursework 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 remains 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.

**Assessments and Examinations**

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 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 Seminar Requirements;
9. Pass the Preliminary Examination.

**Language Requirements**
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 based on the exam results. 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.
Doctoral
Minor/Breadth
All doctoral students are required to complete coursework in a primary area, a secondary area, and one or more minor areas. Students are expected to consult with their advisors concerning minor/breadth requirements.

REQUIRED COURSES
Students choose from one of eight graduate research areas for their Primary Area:

Automatic Control Systems

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 717</td>
<td>Linear Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 817</td>
<td>Nonlinear Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 821</td>
<td>Optimal Control and Variational Methods</td>
<td>3</td>
</tr>
</tbody>
</table>

Select 6 credits from the following:

- E C E 719 Optimal Systems
- E C E/M E 739 Advanced Robotics
- E C E/CBE/MATH 777 Nonlinear Dynamics, Bifurcations and Chaos
- E C E 901 Special Topics in Electrical and Computer Engineering
- MATH 521 Analysis I

Select 3 credits from the following:

- E C E 730 Modern Probability Theory and Stochastic Processes

Biomedical Engineering

At least 12 credits of E C E courses, only 3 of which may be at the 600-level or below and at least 3 credits of coursework in the biological sciences at the 300 level or higher. The specific course plan must be approved by a committee of three E C E faculty from Biomedical Engineering area, which may include the advisor. Courses that are cross-listed with Electrical and Computer Engineering are not eligible to satisfy the biological sciences requirement. Examples of suitable biological sciences courses include ANAT&PHY 335 Physiology, B M E/CBE 510 Introduction to Tissue Engineering, B M E/CBE 520 Stem Cell Bioengineering, ZOOLOGY/PSYCH 523 Neurobiology, ZOOLOGY 570 Cell Biology, and BIOCHEM 501 Introduction to Biochemistry.

Computer Engineering

At least 18 credits from the following list:

- E C E 453 Embedded Microprocessor System Design (Must take one of these.)
or E C E 554 Digital Engineering Laboratory
- E C E 537 Communication Networks
- E C E 551 Digital System Design and Synthesis
- E C E/COMP SCI 552 Introduction to Computer Architecture (Must take this class.)
- E C E 553 Testing and Testable Design of Digital Systems
- E C E 555 Digital Circuits and Components
- E C E 556 Design Automation of Digital Systems

Must include at least 2 courses from below:

- E C E/COMP SCI 707 Mobile and Wireless Networking
- E C E/COMP SCI 750 Real-time Computing Systems
- E C E 751 Embedded Computing Systems
- E C E/COMP SCI 752 Advanced Computer Architecture I
- E C E 753 Fault-Tolerant Computing
- E C E/COMP SCI 755 VLSI Systems Design
- E C E/COMP SCI 756 Computer-Aided Design for VLSI
- E C E/COMP SCI 757 Advanced Computer Architecture II
- E C E 901 Special Topics in Electrical and Computer Engineering

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. An exemption may not be used to satisfy the requirement for two courses at the 700-902 level.

1 These tracks are internal to the program and represent different pathways a student can follow to earn this degree. Track names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

### Electromagnetic Fields and Waves

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 545</td>
<td>Advanced Microwave Measurements for Communications</td>
<td></td>
</tr>
<tr>
<td>E C E 547</td>
<td>Advanced Communications Circuit Design</td>
<td></td>
</tr>
<tr>
<td>E C E 740</td>
<td>Electromagnetic Theory (Strongly recommended)</td>
<td></td>
</tr>
<tr>
<td>E C E 742</td>
<td>Computational Methods in Electromagnetics</td>
<td></td>
</tr>
<tr>
<td>E C E 744</td>
<td>Theory of Microwave Circuits and Devices</td>
<td></td>
</tr>
<tr>
<td>E C E/PHYSICS 748</td>
<td>Linear Waves</td>
<td></td>
</tr>
<tr>
<td>E C E/N E/PHYSICS 749</td>
<td>Coherent Generation and Particle Beams</td>
<td></td>
</tr>
<tr>
<td>E C E 841</td>
<td>Electromagnetic Radiation and Transmission</td>
<td></td>
</tr>
<tr>
<td>E C E/PHYSICS 848</td>
<td>Nonlinear Waves</td>
<td></td>
</tr>
<tr>
<td>E C E 901</td>
<td>Special Topics in Electrical and Computer Engineering (no more than 2 semesters can be used to fulfill this requirement.)</td>
<td></td>
</tr>
</tbody>
</table>

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### Energy and Power Systems

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 411</td>
<td>Introduction to Electric Drive Systems</td>
<td>3</td>
</tr>
<tr>
<td>E C E 412</td>
<td>Power Electronic Circuits</td>
<td>3</td>
</tr>
<tr>
<td>E C E 427</td>
<td>Electric Power Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Choose 12 credits from the following list:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 504</td>
<td>Electric Machine &amp; Drive System Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E 511</td>
<td>Theory and Control of Synchronous Machines</td>
<td></td>
</tr>
<tr>
<td>E C E 512</td>
<td>Power Electronics Laboratory</td>
<td></td>
</tr>
<tr>
<td>E C E 711</td>
<td>Dynamics and Control of AC Drives</td>
<td></td>
</tr>
<tr>
<td>E C E 712</td>
<td>Solid State Power Conversion</td>
<td></td>
</tr>
<tr>
<td>E C E 713</td>
<td>Electromagnetic Design of AC Machines</td>
<td></td>
</tr>
</tbody>
</table>

### Plasmas and Controlled Fusion

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E/N E/PHYSICS 525</td>
<td>Introduction to Plasmas</td>
<td>3</td>
</tr>
</tbody>
</table>

Choose 3 credits from the following list:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>N E 526</td>
<td>Laboratory Course in Plasmas</td>
<td></td>
</tr>
<tr>
<td>E C E/N E/PHYSICS 527</td>
<td>Plasma Confinement and Heating</td>
<td></td>
</tr>
<tr>
<td>E C E/N E 528</td>
<td>Plasma Processing and Technology</td>
<td></td>
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</tbody>
</table>

Choose one course from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E/N E/PHYSICS 724</td>
<td>Waves and Instabilities in Plasmas</td>
<td></td>
</tr>
<tr>
<td>E C E/N E/PHYSICS 725</td>
<td>Plasma Kinetic Theory and Radiation Processes</td>
<td></td>
</tr>
<tr>
<td>E C E/N E/PHYSICS 726</td>
<td>Plasma Magnetohydrodynamics</td>
<td></td>
</tr>
<tr>
<td>E C E/PHYSICS 748</td>
<td>Linear Waves</td>
<td></td>
</tr>
<tr>
<td>E C E/PHYSICS 848</td>
<td>Nonlinear Waves</td>
<td></td>
</tr>
</tbody>
</table>

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### Solid State Electronics and Photonics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 434</td>
<td>Photonics</td>
<td></td>
</tr>
<tr>
<td>E C E 445</td>
<td>Semiconductor Physics and Devices</td>
<td></td>
</tr>
<tr>
<td>E C E 466</td>
<td>Electronics of Solids</td>
<td></td>
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</tbody>
</table>

Choose 18 credits from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>E C E 536</td>
<td>Integrated Optics and Optoelectronics</td>
<td></td>
</tr>
<tr>
<td>E C E 541</td>
<td>Analog MOS Integrated Circuit Design</td>
<td></td>
</tr>
<tr>
<td>E C E 542</td>
<td>Introduction to Microelectromechanical Systems</td>
<td></td>
</tr>
</tbody>
</table>

Students with strong interdisciplinary interests (e.g., control, reliability, materials, optimization techniques, numerical methods, electromagnetics, 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: E C E 512 is not regularly scheduled.
The purpose of ECE 610 is to expose students in their first semester 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 research in areas other than their own.

**POLICIES**

**GRADUATE SCHOOL POLICIES**

The Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

**MAJOR-SPECIFIC POLICIES**

**GRADUATE PROGRAM HANDBOOK**

The Graduate Program Handbook (https://docs.google.com/document/d/1vZDPUN5CGy2RdI75mDnD2ZAsG7-bBI7OxOLGf5T0HnY/edit?usp=sharing) is the repository for all of the program's policies and requirements.

**PRIOR COURSEWORK**

**Graduate Work from Other Institutions**

With program approval, students are allowed to count graduate coursework from other institutions toward the minimum graduate degree credit requirement. Up to 7 credits of ECE courses numbered 700 or above can be counted toward the minimum graduate residence credit requirement. No credits from other institutions can be counted toward the minimum graduate residence credit requirement. Coursework earned ten or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

**UW–Madison Undergraduate**

With program approval, up to 7 credits numbered 400 or above can be counted toward the minimum graduate degree credit requirement. Up to 7 credits of ECE courses numbered 700 or above can be counted toward the minimum graduate coursework (50%) requirement. No credits can be counted toward the minimum graduate residence credit requirement.

**UW–Madison University Special**

With program approval, students are allowed to count up to 9 credits of coursework numbered 400 or above taken as a UW–Madison University Special student toward the minimum graduate residence credit requirement, and the minimum graduate degree credit requirement. Courses numbered 700 or above taken as a UW–Madison Special student toward the minimum graduate coursework (50%) requirement. Coursework earned ten or more years prior to admission to a doctoral degree is not allowed to satisfy requirements.

**PROBATION**

Students must be in good academic standing with the Graduate School, their program, and their advisor. The Graduate School regularly reviews the record of any student who received grades of BC, C, D, F, or I in graduate-level courses (300 or above), or grades of U in research and thesis. This review could result in academic probation with a hold on future enrollment, and the student may be suspended from graduate studies.

The Graduate School may also put students on probation for incompletes not cleared within one term. All incomplete grades must be resolved before a degree is granted.

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**Secondary Area Course Requirement**

The Secondary Area Course Requirement consists of a minimum of six credits of University of Wisconsin ECE courses numbered 700 or higher outside the student's primary area. Secondary area courses need not be in the same ECE specialty area, and cannot be used to satisfy the student's Ph.D minor program. No research courses can be used to satisfy this requirement, but ECE independent study may be used to satisfy this requirement, but ECE independent study may be used to satisfy this requirement, but ECE independent study may be used to satisfy this requirement, but ECE independent study may be used to satisfy this requirement, but ECE independent study may be used to satisfy this requirement, but ECE independent study may be used to satisfy this requirement.

The secondary area courses must be achieved with a grade point average of 3.25 or higher. Up to six credits of the secondary area courses may be substituted with other graduate-level courses if approved by the student's advisor and the ECE graduate committee following submission of a coherent course plan that justifies the substitution. The Secondary Area Course Approval Form is available in online at: https://www.engr.wisc.edu/app/uploads/2016/01/ECE-graduate-phd-secondary-area-course-approval-form-2.pdf

**ECE 610 Seminar in Electrical and Computer Engineering Requirement**

All on-campus ECE graduate students must register for ECE 610 during their first semester of graduate studies. Ph.D. degree seeking students must take 1 credit of ECE 610 in the Fall semester of which they are entering the program and 2 credits of ECE 610 in the following Spring semester. This requirement must be done in the Ph.D. student's first year. Due to the additional credits, these seminar credits will count toward the 51 credits required by the Ph.D. degree.

The Graduate Program Handbook is the repository for all of the program's policies and requirements.
The status of a student can be one of three options:

1. Good standing (progressing according to standards; any funding guarantee remains in place).
2. Probation (not progressing according to standards but permitted to enroll; loss of funding guarantee; specific plan with dates and deadlines in place in regard to removal of probationary status.
3. Unsatisfactory progress (not progressing according to standards; not permitted to enroll, dismissal, leave of absence or change of advisor or program).

A semester GPA below 3.0 will result in the student being placed on academic probation. If a semester GPA of 3.0 is not attained during the subsequent semester of full time) the student may be dismissed from the program or allowed to continue for 1 additional semester based on advisor appeal to the Graduate School.

**ADVISOR / COMMITTEE**

An oral examination is required in defense of the completed Ph.D. dissertation. 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 four or more members of the graduate faculty and is chaired by the student’s advisor. At least one committee member must be from outside the ECE department and field, and at least two committee members must be from within the ECE Department. Students must designate at least three members of their committee to be readers of their dissertation. A student must provide copies of their Ph.D. thesis to defense committee members at least two weeks prior to the scheduled defense.

The final examination cannot be taken until all other requirements for the Ph.D. have been satisfied, including being eligible to receive dissertation status. The student’s record must be cleared of all Incomplete and Progress “P” grades (ECE 990 grades can be cleared after the student has successfully defended their dissertation).

Students must request the Final Examination Warrant from the Graduate Student Services Office, 3182 Mechanical Engineering, at least three weeks prior to the date of the examination. The Student Services Office must be notified of the student’s examination date, time, and other defense details 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.

**CREDITS PER TERM ALLOWED**

15 credits

**TIME CONSTRAINTS**

The qualifying exam must be taken in the fourth semester of study. The preliminary examination must be passed in the fourth year of study.

A candidate for a doctoral degree who fails to take the final oral examination and deposit the dissertation within five years after passing the preliminary examination may by require to take another preliminary examination and to be admitted to candidacy a second time.

Doctoral degree students who have been absent for ten or more consecutive years lose all credits that they have earned before their absence. Individual programs may count the coursework students completed prior to their absence for meeting program requirements; that coursework may not count toward Graduate School credit requirements.

**OTHER**

Funding is not guaranteed and applicants should be prepared to fund their degree. The department awards a small number of research assistantships, teaching assistantships, project assistantships, and fellowships each year. All applications are automatically considered for department funding.

**PROFESSIONAL DEVELOPMENT**

**GRADUATE SCHOOL RESOURCES**

Take advantage of the Graduate School’s professional development resources [https://grad.wisc.edu/pd](https://grad.wisc.edu/pd) to build skills, thrive academically, and launch your career.

**LEARNING OUTCOMES**

1. Demonstrate an ability to synthesize knowledge from a subset of the biological, physical, and social sciences to help frame problems critical to the future of their discipline.
2. Conduct original research.
3. Demonstrate an ability to create new knowledge and communicate it to their peers.
4. Fosters ethical and professional conduct.

**PEOPLE**

**Faculty:** Professors Booske (chair), Gubner (vice-chair), Anderson, Barmish, Behdad, Boston, Botez, Davoodi, DeMarco, Farrell, Fawaz, Hagness, Hitchon, Hu, Jahns, Jiang, Jog, Kats, Kim, Knezevic, Lesieutre, Lessard, Li, Lipasti, Ludois, Ma, Mawst, Milenkovic, Nowak, Papailiopoulos, Ramanathan, Roald, San Miguel, Sayeed, Sethares, Severson, Shohet, van der Weide, Van Veen, Velten, Venkataramanan, Wendt, Willett, Yu