2017-2018 Graduate Handbook

SCHOOL OF ELECTRICAL ENGINEERING & COMPUTER SCIENCE

Office of the Graduate Coordinator
SCHOOL OF EECS | WASHINGTON STATE UNIVERSITY

Contents

EECS Graduate Programs Overview

Programs Offered

Master of Science
The School of Electrical Engineering and Computer Science offers Masters of Science programs, with thesis and non-thesis options in electrical engineering, computer science, and computer engineering, and an **online** non-thesis degree in software engineering.

Doctor of Philosophy
The School of Electrical Engineering and Computer Science offers Doctorate degrees in electrical engineering (including computer engineering), and computer science.

Our world-class faculty includes a member of the National Academy of Engineering and seven Fellows of national professional societies such as IEEE and the Institute of Physics.

Research Areas in Electrical and Computer Engineering:
- Power engineering
- Microelectronics
- Electromagnetics and optical communications
- Control systems
- Signal processing and communications
- Embedded systems

Research Areas in Computer Science
- Algorithms and theory of computing
- Computer networks and distributed computing
- Machine Learning and Artificial Intelligence
- Data Science
- Bioinformatics and Computational Biology
- High Performance Computing
- Human Computer Interaction
- Software Engineering

EECS Graduate Admission

Admission

The School of Electrical Engineering & Computer Science evaluates applicants for admission to its graduate programs based on college transcripts, undergraduate/graduate GPA, the score on the general GRE, (3) letters of recommendation, a statement of purpose, and TOEFL score (if applicable).

Apply online at http://www.gradschool.wsu.edu. Materials that are mailed must be sent to the Graduate School at P.O. Box 641030, Pullman, WA 99164-1030; if you use express mail, send items to the Graduate School, French Administration Building, Room 324, Pullman, WA 99164-1030.

Applications will be evaluated by the EECS Graduate Studies Committee and applicants deemed most qualified will be recommended to the Graduate School for admission (please note that admission may still be denied by the Graduate School if an applicant does not meet the minimum University standard for admission).

Program Admission Prerequisites

Electrical Engineering: specific admission requirements for students with non B.S./M.S. in Electrical Engineering

Students whose undergraduate studies did not include material equivalent to that covered in the following WSU courses will be asked to take course work to resolve that undergraduate deficiency: **EE 214, 261, 311, 234, 321, 331, 352, and any three of 341, 351, 361, , or CptS 360**. *All or most of these courses should be completed before the student is eligible for admission into the MS or PhD Program in EE.* In addition, the committee may require the student to complete other undergraduate deficiencies including courses that are prerequisite to graduate courses.

Computer Engineering: specific admission requirements for students with non B.S./M.S. in Computer Engineering

Students whose undergraduate studies did not include material equivalent to that covered in the following WSU courses will be asked to take course work to resolve that undergraduate deficiency**: CptS 121, 122, 360, EE 214, 234, 324, 334, and Math 216**. *All or most of these courses should be completed before the student is eligible for admission into the MS or PhD Program in CptE.* In addition, the committee may require the student to complete other undergraduate deficiencies including courses that are prerequisite to graduate courses.

Computer Science: specific admission requirements for students with non B.S./M.S. in Computer Science

Students whose undergraduate studies did not include material equivalent to that covered in the following WSU courses will be asked to take course work to resolve that undergraduate deficiency: **CptS 121, 122, 223, 260, 317, 350, 355, 360, Phil 201, and Math 216**. *All or most of these courses should be*

completed before the student is eligible for admission into the MS or PhD Program in Computer Science. The admissions committee may require the student to correct other undergraduate deficiencies as well, including undergraduate prerequisite courses to graduate courses.

Required Application Materials

Graduate Requirement Exam (GRE)
The School of EECS requires scores for the General GRE as part of the application package. There is no published minimum score requirement for the GRE.

English Language Proficiency
All international applicants must demonstrate a basic proficiency in English by submitting official Test of English as a Foreign Language (TOEFL), International English Language Testing System (IELTS), or Michigan English Language Assessment Battery (MELAB) test scores. Applicants from Australia, Bahamas, Barbados, Botswana, Canada, Guyana, Kenya, United Kingdom, Republic of Ireland, Jamaica, New Zealand, Nigeria, and Trinidad and Tobago are exempt from the English proficiency requirement.

The date of the scores must be withintwo years of the expected semester of enrollment and sent directly to the Graduate School from the Educational Testing Service. International students who have or will have graduated with a baccalaureate or higher degree from an accredited four-year U.S. or Canadian college or university within two years of the expected semester of enrollment at the WSU Graduate School are not required to submit TOEFL scores.
Student copies of scores, or photocopies, are not official and will not be used in the admission evaluation process. International applicants who are currently working in the U.S. under an H-1B visa may be recommended by the WSU program chair/director for exemption from the English proficiency requirement if they can provide official documentation that they have been working/studying in the U.S. for a minimum of four years directly prior to the expected semester of enrollment.

The ETS institutional code for WSU and the minimum acceptable TOEFL scores can be found on the Graduate School website for International applicants: http://gradschool.wsu.edu/international-requirements/.

Graduate School Application
Apply for admission to graduate programs via the WSU Graduate School. You may apply online at http://gradschool.wsu.edy/apply

Graduate Student Classifications

Advanced Degree Candidates

Regular Degree Seeking
This classification is for students admitted to the Graduate School with previous course work averaging 3.0 or higher. This cumulative grade point average is taken from the graded undergraduate work or the

graded graduate study of 12 semester hours or more taken after the receipt of the bachelor's degree. International students in this classification must have a grade point average equivalent to a U.S. grade of "B" or better in the last two years of coursework.

Provisional Degree Seeking

This classification is for students whose previous work, as defined above, is below 3.0. Provisional status may be granted because of special departmental recommendations or other indications of outstanding potential. A provisional degree-seeking student must maintain a 3.0 GPA or higher; auto-reinstatement for first semester students whose GPA fall between 2.75 and 2.99 does not apply to provisionally admitted students. If a provisionally admitted student falls below a 3.0 GPA in their first semester of study, the program may choose not to reinstate the student.

Not Advanced Degree Candidates

Not Advanced Degree Candidate (NADC)

This classification is for those students with a baccalaureate degree who apply to a graduate program but are not recommended by the graduate program for admission at the time of application. Generally, applicants are recommended to the NADC classification by the graduate program because the program has determined that the applicant is not academically prepared and additional preparatory work is necessary before they will be considered for admission. Admission as NADC does not obligate the graduate program to admit the student to a degree program at a later date.

Students may be admitted as an NADC with less than a 3.0 cumulative GPA but must maintain a 3.0 GPA once admitted. These students may take any course for which they have the necessary prerequisites except those at the 700-or 800-level.

A maximum of six hours of graduate course work with grades of "B" or higher (nine for non-thesis master's and doctoral degree) earned under NADC classification (and post-baccalaureate) may be applied to graduate degree requirements. Post-baccalaureate students must complete and submit a Reserve Graduate Credit form for approval at the time of registration. Time limits on the course work are the same as for transfer credit.

General Academic Requirements

Enrollment

Students Receiving Financial Support

Each graduate student receiving financial support from the School of Electrical Engineering and Computer Science in the form of a Teaching/Research Assistantship or a Fellowship must register for at least 10 credit hours each semester. At least 9 of these credits should be graded courses unless the student is near the end of the program and the course work is near completion. The remainder of the credits may be made up of research credits, i.e., EE/CptS 700 or 800.

Students considering dropping or withdrawing from a course that will put them below the requirements listed above should have the approval of their advisor, International Programs (if applicable) and/or the Graduate Studies Committee.

International Students

International students are responsible for maintaining their own visa status, with the assistance of the International Programs office.

Typically, students must be considered full-time, enrolled in at least 10-credits, to maintain their visa status. In their last semester, students may apply for a Reduced Course Load via the International Programs office if less than 10 credits are remaining toward completion of their degree (note: an approved Program of Study must be on file with the Graduate School before you are able to apply for a Reduced Course Load).

Continuous Enrollment

Master's Degree Students

All master's degree students are required to enroll for a minimum of 2 credits every fall and spring semester until they complete all of their degree requirements. Graduate leave is available to those degree-seeking students who are in good standing but who must be away from campus for personal reasons (see Graduate School Policies and Procedures for more information regarding Graduate Leave). Students in official internship leave status are not required to register for credit. If master's degree student does not register for credit or go into approved graduate leave or internship leave status, their absence is unapproved. Such students may reenroll and pay a $25 fee if they are absent for one or two consecutive semesters (excluding the summer). Reenrollment also requires departmental approval and is not guaranteed. Students who are absent for three consecutive semesters (excluding the summer) will be dropped from the Graduate School (please see Graduate School Policies and Procedures for more information regarding the Enrollment Policy for M.S. students).

Doctoral Students

Prior to preliminary exams: Prior to taking preliminary exams, all doctoral students are required to enroll for a minimum of 2 credits every fall and spring semester until they complete all of their degree requirements. Graduate leave is available to those students who must be away from campus for

personal reasons (see Graduate School Policies and Procedures for more information regarding Graduate Leave). Students in internship leave status are not required to register for credit. If doctoral students do not register for credit or go into approved graduate leave or internship leave status, their absence is unapproved. Such students may reenroll and pay a $25 fee if they are absent for one or two consecutive semesters (excluding the summer). Reenrollment also requires departmental approval and is not guaranteed. Students who are absent for three consecutive semesters (excluding the summer) will be dropped from the Graduate School.

After successful completion of preliminary exams: After successful completion of preliminary exams, doctoral students are expected to continue to enroll for research credits each semester until they defend their degree. There is a three-year time limitation from the date of the preliminary exam to degree completion. Students who have taken their preliminary exams, have met all of their program requirements except completion of their dissertation, and do not have the funding to register for two or more research credits will be placed into Continuous Doctoral Status for a limited number of semesters. Students in Continuous Doctoral Status will be charged a $50/semester administrative fee and will have limited access to University resources. Please see the Graduate School Policies and Procedures for more information on Continuous Doctoral Status.

Transferring Credits from External Institutions

Regulations

Graded graduate-level course work (with a grade of B or higher) taken toward a master's degree at an accredited institution may be used toward a doctoral degree at WSU per approval via the process outlined below. However, graded graduate-level course work (with a grade of B or higher) taken toward a completed master's degree at an accredited institution may NOT be used toward another master's degree at WSU. All other graded graduate-level course work (with a grade of B or higher) taken as a graduate student, but not taken towards a completed graduate degree, may be used toward a master's degree or a doctoral degree at WSU per approval via the process outlined below. In all transfer cases, the number of such credit hours is limited to no more than half of the total graded course credits required by the program that is listed on the Program of Study. None of this credit may be applied toward another advanced degree.

All transfer course requests must have an equivalent course that has been taught within the school of EECS at WSU; special topics courses that do not have an equivalent counterpart at WSU will not be considered for transfer. Only 6 credits of Special Topics courses may be transferred for use on your Program of Study. No core courses used toward your degree may be transferred.

Transfer credits are subject to the usual time restrictions for master's or doctoral degrees and certificates, and approval by the academic unit and the Graduate School. Credits cannot be more than six years old for a master's or certificate program and ten years old for a doctorate program at the time of graduation.

Procedure

1. Students must have all transfer coursework evaluated prior to the submission of the Program of Study; all transfer processes should be initiated within the first year of enrollment in an EECS graduate degree program.

2. With the support of the faculty advisor, a student will create a preliminary program of study, identifying courses to be transferred and how they will be applied toward the student degree (you will request the preliminary program of study form from the Graduate Coordinator).
3. You will complete a transfer request form for **each** course that you wish to transfer (you will request this form from the Graduate Coordinator). Each form will be accompanied by supporting materials, including syllabus, transcripts, course materials, etc.
4. Materials will be delivered to the Graduate Coordinator who, in concert with the GSC, will select a faculty member to review the content of each course to determine if it is appropriate for transfer.

Graduate Student Evaluations

All Students

Each year the progress of every student will be reviewed by their Faculty Advisor. A written and signed copy of the review is to be placed in the student's file, and a copy will be available to the student. This review, conducted by the EECS Faculty, should indicate the student's progress on course work and on their research. The review will be conducted in spring semester unless there is reason for a fall review.

Teaching Assistants

Performance of Teaching Assistants (TAs) will be evaluated by the instructor and the students for the course(s) which they are assigned to in addition to this. Instructors will have an evaluation distributed and collected by the Graduate Coordinator, available for review immediately. Students will have the opportunity to evaluate TA performance during the course evaluation process, available for review in the semester after the review was completed.

Assistantship Renewal

The Graduate Studies Committee will review all data available, including student evaluations and TA evaluations, at the time of the assistantship renewal process. Students may not be appointed if performance and academic progress are deemed unsatisfactory/

Maximum Timeframe for Degree Completion

Ph.D.

Most students enrolled in doctoral degree programs at WSU require 4-6 years for completion of their program. There are two time limitations for doctoral students:
1. The maximum time allowed for completion of a doctoral degree is 10 years from the beginning date of the earliest course applied toward the degree. This means that the courses (including transfer coursework) on the Program of Study remain valid only for 10 years from the earliest date of the course(s) applied toward the degree.
2. In addition, the doctoral degree must be completed within 3 years of the date of the satisfactory completion of the preliminary examination.

It is imperative that students work closely with their programs to develop a timeline for completion that successfully accommodates both of these deadlines. At least four months must lapse between

preliminary and final examinations for doctoral degrees.

M.S.

Most full-time students enrolled in master's degree programs at WSU require 2-3 years for completion of their program. The maximum time allowed for completion of a master's degree is 6 years from the beginning date of the earliest course applied toward the degree (including transfer work).

Procedure to Request Extension to Degree

For students who are not able to complete their degree within the specified maximum timeframe outline above, you may request an extension to the degree program. Students may request up to 3 extensions. Policies and procedures for extension requests are located in the Graduate School Policies and Procedures handbook.

Minimum GPA Requirements

Deficiency

Graduate students are required to maintain a 3.0 cumulative GPA. Those who fall below this threshold are considered deficient and may be subject to dismissal.

Reinstatement

Graduate students whose cumulative GPA falls below 3.00 are considered to be academically deficient and must be reinstated into the program. In order to apply for reinstatement for the following semester, the Faculty Advisor will need to send a memo of support to the Graduate Coordinator and the student will need to meet with the Faculty Program Coordinator to discuss an academic plan to raise the cumulative GPA above a 3.0. Students who are reinstated are expected to either raise their cumulative GPA above a 3.0 OR obtain a 3.3 GPA in the subsequent semester; students who obtain a 3.3 GPA and still do not meet the cumulative 3.0 GPA requirement may reapply for reinstatement.

Program of Study

Definition

The Program of Study (found at http://gradschool.wsu.edu/facultystaff-resources/18-2/) is an official form documenting the student's plan for courses to take as well as indicating his/her research interests. For master's degree students the Program of Study should be filed with the Graduate School as soon as possible, but no later than the beginning of the semester preceding the anticipated semester of graduation (e.g., anticipated graduation in spring, the Program of Study is due no later than the beginning of the preceding fall semester). For doctoral students, the Program of Study must be filed with the Graduate School before the end of the third semester of study (October 1st deadline for fall; March 1st deadline for spring). The student's Faculty Advisor, in consultation with suggested committee members, should aid the student in the development of his/her proposed Program of Study

General Requirements

In addition to satisfying the academic requirements of your program as presented in the Graduate Handbook, all Program of Studies must meet the Graduate School requirements as listed in the Polices

and Procedures manual on the Graduate School website
(https://gradschool.wsu.edu/documents/2016/08/policies-procedures-manual.pdf).

Guidelines for Directed Study (EE/CptS 595)

Faculty and student will provide an abstract of the planned work by the end of the third week of the semester. A copy of the abstract should be filed with the Academic Coordinator for the students file.

A report describing the work must be submitted at the end of the semester. If a conference or journal paper or Tech Report is generated, a separate report is not necessary.

MS Students may use 3 credits of 595 toward their degrees; PhD Students can use 6 credits of 595 toward their degrees.

Master's Degree Requirements

M.S. in Electrical Engineering

M.S. Thesis Option in Electrical Engineering

Under the Thesis Option, the student is required to take a minimum of:

- 30 total credits of coursework
- 21 credits minimum of graded coursework
- 18 credits minimum of graded EECS departmental coursework
- 9 credits minimum EE 700
- 6 credits maximum approved non-graduate coursework (400-level)
- 6 credits maximum in transfer
- 3 credits maximum of Directed Study (CptS 595)

In order to ensure that each student obtains a reasonable graduate-level understanding of a number of fundamental areas, each MS EE student must complete the following course requirements: at least 3 of the Advanced courses. In addition, based upon the student's focus area (listed below), students must complete the core coursework for their area.

M.S. Thesis Option EE: Core Courses and Required Courses

Advanced Courses

- EE 501 Linear Systems Theory
- EE 507 Random Processes in Engineering
- EE 518 Advanced Electromagnetic Theory
- EE 521 Power Systems Analysis
- EE 523 Power Systems Stability and Control
- EE 524 Digital Systems Architecture
- EE 555 Computer Communication Networks
- EE 571 Advanced Wireless Integrated Circuits and Systems
- EE 582 Cyber Security
- EE 586 VLSI Systems Design
- EE 596 Advanced Analog Integrated Circuits
- CptS 516 Algorithmics

M.S. Thesis Option EE: Focus Areas

- Systems
- Power
- Microelectronics
- Electrophysics
- Computer Engineering

M.S. Thesis Option EE: Coursework

Systems Area core coursework

- E_E 501
- E_E 503

- E_E 507

Power Area core coursework
- E_E 521
- E_E 523

Microelectronics core coursework
- E_E 596
- E_E 571

Electrophysics core coursework
- E_E 518
- E_E 571

Computer Engineering core coursework
- E_E 524
- E_E 586

M.S. Thesis Option EE: Final Examination

The student must file an "Application for Degree" form with the Graduate School on or before the deadline date specified by the Graduate School; this is an on-line process and submission.

The final examination should be scheduled after the student has completed course work, applied for the degree, and had the thesis approved by the advisory committee. Along with the scheduling form for the MS Thesis Final Exam, a List of Publications (submitted, accepted, or in preparation) should be submitted to the GSC. The publication list should include (anticipated) date of submission (or appearance) and the full name of the conference or journal.

Note: At least one paper must have been submitted for publication before the scheduling form will be signed. The examination will be administered by the advisory committee and will cover the thesis defense and the area of knowledge covered by the student's program of study. The advisory committee members must vote on passage or failure and any other member of the permanent faculty may elect to do so. In the event of a failed examination, a second and final attempt may be scheduled at the request of the School after a lapse of at least three months.

M.S. Non-Thesis Option in Electrical Engineering

Under the Non-Thesis Option, the student is required to take a minimum of:
- 30 total credits of coursework
- 28 credits minimum of graded coursework
- 18 credits minimum of graded EECS departmental coursework
- 4 credits minimum of EE 702
- 9 credits maximum approved non-graduate coursework (400-level)
- 6 credits maximum in transfer
- 3 credits maximum of Directed Study (CptS 595)

The student following the course option must take a comprehensive examination in one of the focus areas following completion of their coursework (this will serve as the student's non-thesis final exam). As well, students must take a minimum of 2 advanced courses and receive a grade of B- or higher.

The non-thesis final exam for each focus area will be described under section header "M.S. Non-Thesis Option EE: Final Exam (by area).

M.S. Non-Thesis Option EE: Core Courses and Required Courses

Advanced Courses
- EE 501 Linear Systems Theory
- EE 507 Random Processes in Engineering
- EE 518 Advanced Electromagnetic Theory
- EE 521 Power Systems Analysis
- EE 523 Power Systems Stability and Control
- EE 524 Digital Systems Architecture
- EE 555 Computer Communication Networks
- EE 571 Advanced Wireless Integrated Circuits and Systems
- EE 582 Cyber Security
- EE 586 VLSI Systems Design
- EE 596 Advanced Analog Integrated Circuits
- CptS 516 Algorithmics

M.S. Non-Thesis Option EE: Focus Areas

- Systems
- Power
- Microelectronics
- Electrophysics
- Computer Engineering

M.S. Non-Thesis Option EE: Suggested Coursework

Systems Area core coursework
- E_E 501
- E_E 503
- E_E 507

Power Area core coursework
- E_E 521
- E_E 523

Microelectronics core coursework
- E_E 596
- E_E 571

Electrophysics core coursework
- E_E 518
- E_E 571

Computer Engineering core coursework
- E_E 524
- E_E 586

M.S. Non-Thesis Option EE: Final Exam (by area)

Systems Area final exam.

The systems area comprehensive MS exam will be identical to the systems PhD qualifying exam, with the following exceptions: (1) there will be no breadth category and (2) the passing threshold will be 60%. The exam committee reserves the option to reset the passing threshold, depending on the difficulty of a particular exam. Students who fail the systems area comprehensive MS exam on the first try will be allowed to retake the exam the next time it is offered. Students who fail the exam on their second attempt will not be allowed to take the systems area exam again.

Power Area final exam

The power systems area comprehensive MS exam will be an oral exam with the format and passing requirement determined by the student's committee. The student will be expected to make an oral presentation of material selected by the committee.

Microelectronics final exam

Students choosing Microelectronics as their major area in their non-thesis Master program are required to take and pass EE 596 and EE 571. A pass is considered to be a grade of B or better.

Electrophysics final exam

The electrophysics area comprehensive MS exam will be an oral exam with the format and passing requirement determined by the student's committee. The student will be expected to make an oral presentation of material selected by the committee.

Computer Engineering final exam

The examination committee will select material to evaluate the candidate. The evaluation will consist of a written exam on the subjects within the computer engineering field. The candidate will be given specific, written instructions on each of these components of the exam.

M.S. in Computer Engineering

M.S. Thesis Option in Computer Engineering

Under the Thesis Option, the student is required to take a minimum of:
- 30 total credits of coursework
- 21 credits minimum of graded coursework
- 18 credits minimum of graded EECS departmental coursework
- 9 credits minimum of EE 700
- 6 credits maximum approved non-graduate coursework (400-level)
- 6 credits maximum in transfer
- 3 credits maximum of Directed Study (CptS 595)

In order to ensure that each student obtains a reasonable graduate-level understanding of a number of fundamental aspects of Computer Engineering, the student must successfully complete at least three core courses, which must be passed with a B- grade or better;

M.S. Thesis Option CptE: Core Courses and Required Courses

Core Couress:
- EE 530 Digital Signal Processing
- EE 586 VLSI Systems Design
- EE 524/CptS 561 Advanced Computer Architecture
- CptS 560 Operating Systems
- EE 587 System on Chip Design and Test

M.S. Thesis Option CptE: Final Examination

The student must file an "Application for Degree" form with the Graduate School on or before the deadline date specified by the Graduate School; this is an on-line process and submission.

The final examination should be scheduled after the student has completed course work, applied for the degree, and had the thesis approved by the advisory committee. Along with the scheduling form for the MS Thesis Final Exam, a List of Publications (submitted, accepted, or in preparation) should be submitted to the GSC. The publication list should include (anticipated) date of submission (or appearance) and the full name of the conference or journal.

Note: At least one paper must have been submitted for publication before the scheduling form will be signed. The examination will be administered by the advisory committee and will cover the thesis defense and the area of knowledge covered by the student's program of study. The advisory committee members must vote on passage or failure and any other member of the permanent faculty may elect to do so. In the event of a failed examination, a second and final attempt may be scheduled at the request of the School after a lapse of at least three months.

M.S. Non-Thesis Option in Computer Engineering

Under the Non-Thesis Option, the student is required to take a minimum of:
- 30 total credits of coursework
- 26 credits minimum of graded coursework
- 18 credits minimum of graded EECS departmental coursework
- 4 credits minimum of EE 702
- 9 credits maximum approved non-graduate coursework (400-level)
- 6 credits maximum in transfer
- 3 credits maximum of Directed Study (CptS 595)

In order to ensure that each student obtains a reasonable graduate-level understanding of a number of fundamental areas, each MS CptE student must complete 3 courses of core coursework, as listed below.

M.S. Non-Thesis Option CptE: Core Courses and Required Courses
- EE 530 Digital Signal Processing
- EE 586 VLSI Systems Design
- EE 524/CptS 561 Advanced Computer Architecture
- CptS/EE 555 Computer Communication Networks **OR** EE 503 Structure, Dynamics and Control of Large-Scale Networks
- CptS 560 Operating Systems
- EE 587 System on Chip Design and Test

M.S. Non-Thesis Option CptE: Final Examination

The student must take a comprehensive examination that includes questions from two computer engineering courses: one from (EE 524/CptS 561, EE 586, or EE 587) and one from an EE or CptS course from the student's course program. The student must show proficiency in computer engineering and pass the exam with a minimum grade of 70%; a grade of Pass on your final exam will result in a grade of Pass in 702; a grade of Fail on your final exam will result in a grade of Fail in 702. Students may take the MS comprehensive exam only twice. A failure to pass the examination for the second time will result in a recommendation for dismissal from the CptE graduate program.

M.S. in Computer Science

M.S. Thesis Option in Computer Science
Under the Thesis Option, the student is required to take a minimum of:
- 33 total credits of coursework
- 24 credits minimum of graded coursework
- 18 credits minimum of graded EECS departmental coursework
- 9 credits minimum of CptS 700
- 6 credits maximum approved non-graduate coursework (400-level)
- 6 credits maximum in transfer
- 3 credits maximum of Directed Study (CptS 595)

In order to ensure that each student obtains a reasonable graduate-level understanding of a number of fundamental areas, each MS CptS student must complete the following course requirements. The requirement is 2 courses from the list of "Core" courses (Note: Some tracks may require more than two courses) and 2 courses from the list of "Advanced" courses, for each area. The core courses declared by the student on the MS Program of Study must be passed with a B- grade or better. In addition, Advanced Algorithmics 515 is a mandatory course for all areas.

M.S. Thesis Option CS: Core Courses and Required Courses
Required Courses – All Tracks
- CptS 515: Advanced Algorithmics

M.S. Thesis Option CS: Focus Areas
- Artificial Intelligence / Machine Learning
- Data Science
- Systems and Networking
- Software Engineering

M.S. Thesis Option CS: Required Coursework per Focus Area

Artificial Intelligence and Machine Learning suggested coursework
CORE COURSES:
- Artificial Intelligence (CptS 540)
- Machine Learning (CptS 570)

ADVANCED COURSES:
- Reinforcement Learning (CptS 580)
- Structured Prediction: Algorithms and Applications (CptS 580)
- Gerontechnology (CptS 580)
- Smart Health (CptS 580)
- Other Special Topics courses taught by the Artificial Intelligence and Machine Learning faculty (CptS 580)

Data Science suggested coursework
CORE COURSES:
- Data Science (CptS 475/575)
- Machine Learning (CptS 570)

ADVANCED COURSES:
- Big Data (CptS 415)
- Elements of Network Science (CptS 591)
- Advanced Databases (CptS 580)
- Computational Genomics (CptS 571)
- Graph Theory (CptS 553)
- Other Special Topics courses taught by the Data Science faculty (CptS 580)

Systems and Networking suggested coursework
CORE COURSES:
- Introduction to Computer Networks (CptS 555)
- Distributed Systems (CptS 564)

ADVANCED COURSES:
- Introduction to Parallel Computing (CptS 411)
- Network / Computer Security (CptS 527)
- Operating Systems (CptS 560)
- Advanced Distributed Systems (CptS 580)

- Embedded Systems (CptS 566)
- Other Special Topics courses taught by the Systems and Networking faculty (CptS 580)

Software Engineering suggested coursework
CORE COURSES:
- Software Requirements (CptS 484)
- Software Design and Architecutre (CptS 487)

ADVANCED COURSES:
- Computer Security (CptS 527)
- Software Maintenance (CptS 581)
- Software Quality (CptS 583)
- Software Testing (CptS 582)
- Any other Special Topics course taught by the Software Engineering faculty (CptS 580)

M.S. Thesis Option CS: Final Examination

The student must file an "Application for Degree" form with the Graduate School on or before the deadline date specified by the Graduate School; this is an on-line process and submission.

The final examination should be scheduled after the student has completed course work, applied for the degree, and had the thesis approved by the advisory committee. Along with the scheduling form for the MS Thesis Final Exam, a List of Publications (submitted, accepted, or in preparation) should be submitted to the GSC. The publication list should include (anticipated) date of submission (or appearance) and the full name of the conference or journal.

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M.S. Non-Thesis Option in Computer Science

Under the Non-Thesis Option, the student is required to take a minimum of:
- 30 total credits of coursework
- 26 credits minimum of graded coursework
- 18 credits minimum of graded EECS departmental coursework
- 4 credits minimum CptS 702
- 9 credits maximum approved non-graduate coursework (400-level)
- 6 credits maximum in transfer
- 3 credits maximum of Directed Study (CptS 595)

In their first semester, non-thesis students will be responsible for declaring a focus area and for selecting a 3-member faculty committee composed of an advisor and two committee members aligned with that focus.

M.S. Non-Thesis Option CS: Core Courses and Required Courses

Required Courses – All Tracks

- CptS 515: Advanced Algorithmics

M.S. Non-Thesis Option CS: Focus Areas

- Artificial Intelligence / Machine Learning
- Data Science
- Systems and Networking
- Software Engineering

M.S. Non-Thesis Option CS: Required Coursework per Focus Area

Artificial Intelligence and Machine Learning suggested coursework

CORE COURSES:

- Artificial Intelligence (CptS 540)
- Machine Learning (CptS 570)

ADVANCED COURSES:

- Reinforcement Learning (CptS 580)
- Structured Prediction: Algorithms and Applications (CptS 580)
- Gerontechnology (CptS 580)
- Smart Health (CptS 580)
- Other Special Topics courses taught by the Artificial Intelligence and Machine Learning faculty (CptS 580)

Data Science suggested coursework

CORE COURSES:

- Data Science (CptS 475/575)
- Machine Learning (CptS 570)

ADVANCED COURSES:

- Big Data (CptS 415)
- Elements of Network Science (CptS 591)
- Advanced Databases (CptS 580)
- Computational Genomics (CptS 571)
- Graph Theory (CptS 553)
- Other Special Topics courses taught by the Data Science faculty (CptS 580)

Systems and Networking suggested coursework

CORE COURSES:

- Introduction to Computer Networks (CptS 555)
- Distributed Systems (CptS 564)

ADVANCED COURSES:

- Introduction to Parallel Computing (CptS 411)

- Network / Computer Security (CptS 527)
- Operating Systems (CptS 560)
- Advanced Distributed Systems (CptS 580)
- Embedded Systems (CptS 566)
- Other Special Topics courses taught by the Systems and Networking faculty (CptS 580)

Software Engineering suggested coursework
CORE COURSES:
- Software Requirements (CptS 484)
- Software Design and Architecutre (CptS 487)

ADVANCED COURSES:
- Computer Security (CptS 527)
- Software Maintenance (CptS 581)
- Software Quality (CptS 583)
- Software Testing (CptS 582)
- Any other Special Topics course taught by the Software Engineering faculty (CptS 580)

M.S. Non-Thesis Option CS: Final Examination

No later than the second week of the student's graduating semester (i.e., the final academic semester of coursework), he/she must inform the committee of his/her plan to graduate that semester. Subsequently, the committee will assign a survey exam, which will comprise one or more research papers related to the track, together with a specific set of questions relating to the topic of the research papers. The student will be asked to write a 5-page report (in scientific format) that addresses the questions and submit it to the committee before the fifteenth week of classes. The committee will then grade the report to determine a PASS/FAIL grade and forward the signed ballot to the Graduate Studies Committee.

Each Non-thesis student must be enrolled in at least 2 credits of 702 during the semester that they intend to graduate.

The Program of Study

Filing the Program of Study

After the proposed Program of Study form is completed by the graduate student, it must be signed by each advisory committee member and submitted to the program chair of the major graduate program and the chair of the minor program (if applicable) who ensure that it meets the requirements of the programs and Graduate School.The chair will submit the Program of Study to the Dean of the Graduate School for approval to assure that it meets the minimum requirements of the Graduate School.

Changing the Program of Study

Changes made to the Program of Study must be documented with the appropriate signatures signifying the endorsement of the master's committee and the approval of the chair of the program and submitted to the Graduate School. If program changes are made, the Change of Program form must be

completed, signed and submitted to the Graduate School before a student may submit an Application for Degree.

Fulfilling the Program of Study

Once approved, the master's Program of Study becomes the basis of the requirements for the degree.

Doctoral Degree Requirements

Ph.D. in Electrical Engineering

The Doctoral Degree in Electrical Engineering should consist of a minimum of:

- 72 total credits of coursework
- 35 credits minimum of graded coursework
- 30 credits minimum of research (EE 800)
- 17 credits maximum of transfer coursework
- 9 credits maximum of non graduate (400-level) coursework
- 6 credits maximum of Directed Study (EE/CS 595)

Any undergraduate coursework assigned to the student to make up for undergraduate deficiencies at the time of admission **may not** be used toward the student's degree.

Ph.D. in EE: Core Courses and Required Courses

The program of course work for the PhD in Electrical and Computer Engineering must include at least three of the following core courses. The core courses declared by the student on the PhD Program of Study must be passed with a B grade or better;

- EE 501 Linear System Theory
- EE 503 Structure Dynamics and Control of Large-Scale Networks **OR** EE 555 Computer Communication Networks*
- EE 507 Random Processes In Engineering
- EE 518 Advanced Electromagnetic Theory
- EE 521 Power Systems Analysis
- EE 523 Power Systems Stability and Control
- EE 524 Digital Systems Architecture
- EE 571 Advanced Wireless Integrated Circuits and Systems
- EE 586 VLSI Systems Design
- EE 596 Advanced Analog Integrated Circuits
- CptS 516 Algorithmics

***Note**: Only one course from EE 503 and EE 555 can be counted as one of the three required core courses.

All core courses must be successfully completed within three semesters of admission to the program. Students may petition the Graduate Studies Committee (GSC) to include transfer credits, but only if equivalent courses are offered at the graduate level, are completed in a

recognized graduate school as a graduate student, and are clearly consistent with the objectives of the student's PhD program at WSU. Students can take more core courses than the minimum required from the list of core courses. If the students receive a grade below our requirement mentioned above, Dr. Saberi will write an exception memo to the Grad School for the Repeat and the Grad School will go into the system and update the student's transcript with the better grade/ required grade once complete. This is again applicable for the declared core courses. All graded coursework should be completed or in progress before scheduling your Preliminary Examination.

Minor Areas in EE

Students will need to select a "minor area" in EE and complete suggested coursework in order to meet the requirements for their Qualifying Exam (QE) and to be granted Advanced Graduate Standing (AGS). A grade of B+ or higher is required to satisfy the QE minor area requirements. The minor Areas and coursework are as follows:

Systems Area,
- E_E 501
- E_E 507

Power Area
- E_E 521
- E_E 523

Microelectronics
- E_E 576
- E_E 571

Electrophysics
- E_E 518
- One of E_E 431, E_E 432 or E_E 520

Computer Engineering, 2 of:
- E_E 524/CptS 561
- E_E 586
- E_E 587

Ph.D. in Computer Science

The Doctoral Degree in Computer Science should consist of a minimum of:

- 72 total credits of coursework
- 35 credits minimum of graded coursework
- 30 credits minimum of research (CS 800)

- 17 credits maximum of transfer coursework
- 9 credits maximum of non graduate (400-level) coursework
- 6 credits maximum of Directed Study (EE/CS 595)

Any undergraduate coursework assigned to the student to make up for undergraduate deficiencies at the time of admission **may not** be used toward the student's degree.

Ph.D. in CS: Core Courses and Required Courses

The following non-graded, 1-credit course is required for all Pullman campus students their first fall in residence:

- CptS 500 Proseminar

The program of course work for the PhD in Computer Science includes the following required course;

- CptS 515 Advanced Algorithmics

And, at least 3 of the following core courses. The core courses declared by the student on the PhD Program of Study must be passed with a B grade or better;

- CptS 543 Human Computer Interaction
- CptS 550 Parallel Computation
- CptS 555 Computer Communication Networks
- CptS 560 Operating Systems
- CptS 561 Computer Architecture
- CptS 564 Distributed Systems
- CptS 527 Computer Security
- CptS 542 Computer Graphics
- CptS 540 Artificial Intelligence
- CptS 570 Machine Learning
- CptS 571 Computational Genomics

All the required and core courses should be successfully completed within three semesters of admission to the program. Students may petition the Graduate Studies Committee (GSC) to include transfer credits, but only if equivalent courses are offered at the graduate level, are completed in a recognized graduate school as a graduate student, and are clearly consistent with the objectives of the student's PhD program at WSU. All coursework should be completed or in progress prior to scheduling of the Preliminary Exam.

Qualifying Exam

The purpose of the PhD qualifying exam (QE) is to assess the student's depth and breadth of knowledge suitable for the doctoral program. Passing the QE is required for Advanced Graduate Standing (AGS), the status that permits students to pursue the PhD degree.

This examination will be taken no later than the end of the student's third semester in the PhD program. The exam will be given each semester. If any area committee chooses not to offer its exam in Spring Semester, the student may postpone that area exam for one semester. Students must sign up for the exam in the second semester in the program, or no later than the second week of the third semester. Engineering students must at this time specify their areas of depth and breadth. Area committees in Electrical and Computer Engineering should administer major area examinations before the end of the semester and the minor area examinations before the end of the semester. The QE in Computer Science should follow the same general schedule. The results of the examinations should be reported to the GSC by the end of the before the end of the semester. The GSC should meet soon afterwards to discuss the results.

Advanced Graduate Standing (AGS)

AGS is the departmental designation for official permission to pursue a PhD degree. The Graduate Studies Committee (GSC) grants AGS status. The GSC considers a student for AGS within three weeks of completing the PhD Qualifying Exam. The process of evaluation of AGS is based on:
- The student's performance on the PhD qualifying examination,
- Performance in graduate courses,
- Letter of recommendation from the student's research advisor, and
- Other information pertinent to the student's ability to perform high-quality doctoral-level work.

The Graduate Studies Committee may:
- Grant AGS,
- Grant AGS with specified conditions,
- Grant continuation in the program with reevaluation by the GSC after specified conditions are satisfied, or terminate the student from the PhD program.

QE Timetable
- At the beginning of every semester, the Graduate Coordinator will identify students who are required to take the examination and send them a form to sign up for QE.
- ECE students must identify the area (depth) in which they desire to be examined. The students are required to coordinate with the chair of the appropriate area committee. Each area committee will choose exam dates for QE.
- The exam is administered according to the schedule set by each area committee.
- Area committees must have recommendations to the Graduate Studies Committee within two weeks after the exam is administered.
- Graduate Studies Committee decisions on Advanced Graduate Standing will be issued and letters will be distributed as results are known.

QE in Electrical Engineering

Minor Areas:

The Minor area requirement portion of the ECE QE consists of taking two courses in the chosen breadth/minor area and passing each course with a minimum grade of B+, subject to the following criteria:

- The eligible QE courses will be defined by each area faculty. A combination of a core course plus a choice of a course from a set of eligible courses is recommended.
- A maximum of one transferred course can be used to partially meet the Minor area QE requirement. The eligibility of a course for transfer and its associated grade will be determined by the area faculty.
- For each Minor area requirement course that the student fails to make a grade of B+ or better, s/he must take another course in the minor area and make a grade of at least B+. The choice of the second-attempt course(s) and any petitioned exceptions (e.g., taking a course outside the minor area or retaking a course with a grade of C or lower) will be determined and approved by a committee consisting of the Minor area faculty and the student's PhD supervisor.
- Students have a maximum of 2 tries to achieve a grade of B+ or better for each of the two courses that satisfy their Minor. Failure to meet this criterion will result in dismissal from the program (independent of the Major area QE results).
- If a student decides to change his/her minor area, s/he must meet the Minor area requirement for the new area (this case may arise if a student changes his/her Minor area).

To satisfy the minor area, the following coursework must be completed with a grade of B+ or better:

Systems Area,
- E_E 501
- E_E 507

Power Area
- E_E 521
- E_E 523

Microelectronics
- E_E 576
- E_E 571

Electrophysics
- E_E 518
- One of E_E 431, E_E 432 or E_E 520

Computer Engineering, 2 of:
- E_E 524/CptS 561
- E_E 586
- E_E 587

Major Area Qualifying Exams

The students in the PhD ECE program are required to take one exam in their primary (depth) area. The examination is not, in principle, tied to any particular WSU course; however, it is expected to be at the first-year graduate level in each area. Each area has specific guidelines regarding the nature and format

of the exam as described below. The examining committee in each area will provide a written evaluation of the performance of each student to the GSC. The major advisor of a student taking an exam should not be part of that examining committee and (if a member of the graduate studies committee) will be excused from deliberations and voting. Students must perform satisfactorily in order to pass the QE.

Systems Area

Effective spring 2010, the systems qualifying exam will be a written exam lasting 3 hours 30 minutes and will consist of 7 questions: two each from EE 501 and EE 507 and one each from EE 451, EE 464, and EE 489. Students are required to answer a total of 5 out of the 7 questions. Four of the 5 required answers must be to the questions from EE 501 and EE 507. The other question must be chosen from among the questions for courses EE 451, EE 464, and EE 489.

- The exam will be closed book and closed notes.
- Students may bring two 8.5" x 11" study sheets per course (front and back may be used).
- At the beginning of the exam, students may read the problems from EE 451, EE 464, and EE489 before deciding which one to attempt and retain the two study sheets pertaining to that course.
- Scientific calculators with the following capabilities will be allowed: in addition to basic arithmetic operations, Trigonometric, Log and exponential, Hyperbolic functions. In particular, calculators with significantly more capabilities than those listed, including graphing or programmability will NOT be allowed.
- Students will be allowed to bring in one handbook of mathematical tables (such as a CRC handbook). Printout of an electronic copy of mathematical tables can be substituted as long as the number of pages does not exceed 100 sheets (double-sided).

The systems area examination committee will provide an assessment of each student's performance on the systems qualifying exam to the graduate committee within two weeks after the date of the exam.

The three possible performance assessments for students specializing in the systems area are: (1) Pass; (2) Fail, but be allowed to retake the exam the next time it is offered; (3) Fail, should not be allowed to continue in the systems area. Each question on the systems qualifying exam will be worth 20 points. Students specializing in the systems area will automatically pass the exam if they score 80 or higher. Depending upon the particular exam, the examining committee may set the pass/fail threshold lower than 80. Systems students who fail the exam on their first attempt but who achieve a score within 15 points of the pass/fail threshold will be assessed at performance level (2) above. Systems students who fail to achieve a score greater than or equal to 15 points below the pass/fail threshold on their first attempt or who fail the exam on their second attempt may be assessed at performance level (3).

Students minoring in the Systems area are required to take EE501 and EE507 and obtain a grade of B+ or better in each course.

Power Area

The QE **major examination** will consist of two parts: 1) a written examination and 2) an oral examination.

The written exam will be administered as an in-class, closed book, closed note exam consisting of 7 questions and will last three hours. The student is allowed to bring a scientific calculator with complex matrix and arithmetic functions (with no preloaded programs) and five 8 ½" x 11" single-sided formula sheets. The written QE will be composed of material covered in five the undergraduate power courses at WSU: 1) EE 491; 2) EE 361; 3) EE 486; 4) EE 493; and 5) EE 483 (Distribution). The number of questions represented from each course will be 2, 2, 1, 1, and 1 respectively. The student is expected to answer any five of the seven questions per the student's choice; each question answered will carry a weight of 20 points. A total score of 75 or above is required for a grade of "Pass" in the written QE.

The oral QE will consist of two parts: 1) a viva voce exam with follow-up on solutions in the QE written exam and 2) a 15-minute presentation on a journal publication selected from any IEEE transactions. The student will select the journal article in consultation with the faculty advisor, possibly in relation to the student's research topic. The journal paper should not include an authors from WSU. The student will be expected to answer questions on related subjects to that of the journal article. While the oral exam is open to all power area faculty, the PhD thesis committee is expected to participate in the oral QE. The faculty attending the oral QE will vote on the outcome; a majority vote will determine the student grade for the oral exam.

In case of a grade of Fail in either the written or oral QE, the student is allowed to reattempt once. A second fail grade in the QE will lead to termination from the Ph. D. program.

Microelectronics
Students declaring microelectronics as their major field will complete a two-part evaluation. The examining committee will first select between 3 and 5 relevant research papers from which the student will have 3 weeks to provide a five-page, double-spaced paper summarizing and interpreting the research in these papers. After the student has submitted this written report to the committee, there will be an exam scheduled for which the student will present these results in a 20-30 minute presentation. After this time, the committee will have an oral question and answer period to assess the student's knowledge of the fundamentals and the student's analytical abilities.

The microelectronics area examination committee (consisting of three faculty and may not include the student's advisor) will provide an assessment of each student's performance to the graduate studies committee within two weeks after the date of the oral exam.

Performance assessment guidelines for students majoring in the microelectronics area:

The three possible performance assessments for students specializing in the microelectronics area will be: (1) Pass; (2) Fail, but may be allowed to retake the exam the next time it is offered; (3) Fail, should not be allowed to continue in the microelectronics area.

Electrophysics
PhD students with a major emphasis of electrophysics must pass EE 518 with a grade of B or better. Additionally, students must pass a written and oral examination that assesses a

student's readiness to undertake research at the PhD level. The written and oral examination is normally taken in the third semester following admission into the WSU PhD program. The exam material consists of a set of research questions and a set of related research papers. This material is delivered to the student at the start of business on a Friday. The student prepares a written report of 10-20 pages based on the material provided. The written report is submitted in electronic form to the chair of the examining committee by 11:59 p.m. the following Tuesday. On the following Friday, the committee administers the oral portion of the exam. The oral exam is scheduled for two hours. The student prepares a presentation of approximately 30 minutes on his or her answers to the research questions. During the student's presentation the committee primarily asks questions to probe the student's depth of understanding of material directly related to the written examination. However, students should also expect general questions pertinent to graduate study in electrophysics.

A student will have passed the exam if at least two of the three members of the examining committee judge the student to have passed. Any faculty member may attend the oral exam and ask questions of the student, but only the examining committee members have a direct say in grading the student's performance.

At the request of the student's faculty advisor, a student who fails the exam may retake the exam the following semester. Students who fail the exam twice may not retake it again.

Examining Committee: PhD students majoring in electrophysics are appointed an examining committee consisting of three people. One person is designated the chair of the committee. The student's advisor will typically serve on the committee but cannot be the chair.

It is the responsibility of the student's faculty advisor to provide material for the written exam but the entire committee must approve the exam. The number of questions and the number of research papers is at the discretion of the committee.

Within two weeks of the completion of the written and oral exams, the chair of the examining committee will report the result to the graduate advisor and the other electrophysics faculty.

Computer Engineering
The computer engineering examination will be a written exam lasting two hours and will consist of six questions: two each from EE 524 (CptS 561), EE 586, and EE 587. Students whose major area is computer engineering are required to answer a total of four out of the six questions.

The computer engineering area examination committee will provide an assessment of each student's performance on the CptE qualifying exam to the Graduate Studies Committee within two weeks after the date of the exam.

Performance assessment guidelines for students majoring in the CptE area: The three possible performance assessments for students specializing in the CptE area will be: (1) Pass; (2) Fail, but

be allowed to retake the exam the next time it is offered; and (3) Fail, should not be allowed to continue in the CptE area. Each question on the computer engineering qualifying exam will be worth 25 points. Students specializing in the computer engineering area will automatically pass the exam if they score 80 or higher. Depending upon the particular exam, the examining committee may set the pass/fail threshold lower than 80. Computer engineering students who fail the exam on their first attempt but who achieve a score within 15 points of the pass/fail threshold will be assessed at performance level 2 (see above). Computer engineering students who fail to achieve a score greater than or equal to 15 points below the pass/fail threshold on their first attempt or who fail the exam on their second attempt will be assessed at performance level 3 (see above).

QE in Computer Science

Breadth Requirement

A student must take at least 15 graded credits of computer science courses (i.e., excluding CptS 595 and CptS 500) at the 500 level. A grade point average of 3.70 must be obtained for these 15 credits. The courses making up the 15 credits may be selected from a larger set of courses that the student has completed. A course with a grade below B cannot be applied toward this requirement. The courses must include CptS 516 and courses from the current catalog. Graded graduate credits transferred from other institutions may be used to fulfill up to 6 credits of the 15 graded credits required for the breadth requirement.

A student who has not fulfilled this requirement at the end of two semesters of study must nevertheless take the written and oral portions of the qualifying exam in the scheduled semester (see Section 3.5.1.2), taking courses and achieving sufficient grades in that semester to meet the breadth requirement. A student who does not meet the breadth requirement by the end of the third semester will be dismissed as a PhD student.

Depth Requirement: Exam Structure

The written and oral qualifying examination is normally taken following completion of the breadth requirement, in the third semester following admission to the WSU PhD program in Computer Science. It must be taken prior to the completion of 21 graded graduate credit hours in the PhD Program at WSU. This examination is intended to ascertain the student's readiness to undertake research at the PhD level. The student will be examined in an appropriate area selected by the student and his or her advisor.

The exam is a take-home exam given on a Friday and due the following Tuesday. On the following Friday, the committee administers the oral portion of the exam. For the examination, the student is given a set of research questions and a set of related research papers. The student prepares a written report of 10-20 pages based on the papers and the questions. The oral exam consists of a presentation and defense by the student of the answers to the research questions, which can be expected to take up most of the examination. Students should also expect some general questions not directly related to the take-home questions.

If a student fails the exam, it may be retaken once during the following semester.

The retake need not be in the same area as the failed examination, but only one retake is allowed.

Qualifier Expectations

Students should have done work equivalent to taking 500-level courses in the examination area. They must be able to read and comprehend the recent literature in that topic area and be able to critique and compare the motivations, methods, and results of the work. They must be able to find related material in the library and on the Internet. They must be able to write a scholarly report on a collection of papers that includes reviews of the papers and conclusions produced by synthesizing information from multiple papers. They must be able to orally present their findings with supporting visual materials to the examination committee. They must be able to answer technical questions about the material they read and present.

Grading

Each committee grades the exams in their area and reports the results to the CptS permanent faculty. Each report includes a pass/fail recommendation and a summary of the student's performance on the exam. If no objections to the results are raised within 7 days, the committee's recommendation stands. Otherwise, the graduate CptS faculty meets to discuss the matter and decides by majority vote whether the student passes.

The Program of Study

Filing the Program of Study

After the proposed Program of Study form is completed by the graduate student, it must be signed by each advisory committee member and submitted to the program chair of the major graduate program and the chair of the minor program (if applicable) who ensure that it meets the requirements of the programs and Graduate School.The chair will submit the Program of Study to the Dean of the Graduate School for approval to assure that it meets the minimum requirements of the Graduate School.

Changing the Program of Study

Changes made to the Program of Study must be documented with the appropriate signatures signifying the endorsement of the master's committee and the approval of the chair of the program and submitted to the Graduate School. If program changes are made, the Change of Program form must be completed, signed and submitted to the Graduate School before a student may submit an Application for Degree.

Fulfilling the Program of Study

Once approved, the master's Program of Study becomes the basis of the requirements for the degree.

Doctoral Degree Academic Policies

Preliminary Examination

A doctoral student is advanced to candidacy when he/she passes the Preliminary Examination (PE). The PE should be held no later than the fifth semester of the student's PhD program. If unsuccessful, a student may be allowed to take this examination one more time. The overall format for the PE is described in the WSU Graduate Student Handbook. The specific format of the EECS PE is described below.

The PhD student will submit an 8 to 12-page (single-spaced) "Dissertation Proposal" to the GSC, BEFORE scheduling the PhD preliminary examination and AFTER passing the PhD qualifying examination. This document shall describe the student's intended Ph.D. research in reasonable detail - including introductory and background material, preliminary research conducted, plans for further research, and bibliography. The proposal may serve as the focus for the preliminary exam, although this is not required. Also, there must be a MINIMUM period of SIX (6) months between passing the preliminary exam and taking the PhD final exam (i.e., dissertation defense). The exam itself will consist of the presentation of the proposal by the student and questioning from the committee and permanent faculty. The vote on the PE will be held at the end of the exam.

Final Examination

An oral final examination is given after the completion of the dissertation. This examination (open to the public) is primarily a defense of the dissertation. Along with the scheduling form for the PhD Final Exam, a List of Publications (accepted, submitted, or in preparation) should be submitted to the GSC. The publication list should include date of submission or appearance (or anticipated date) and the full name of the conference or journal. **Note:** The scheduling form will not be signed unless at least one paper has been submitted for publication. The student's doctoral committee must attend and vote and any other member of the WSU Permanent Faculty may also attend and vote. Graduate students often attend PhD oral examinations as spectators. The student must file a Final Examination Scheduling Form indicating preliminary approval of the dissertation; this form also specifies the examination location, date, and time. The form needs to be signed by all Committee and Dr. Saberi and to the Grad School Office at least 2 weeks prior to the date.

Dissertation/Thesis

If the student's dissertation/thesis is approved and the oral defense is passed, the student must provide a digital copy of the dissertation to the School of EECS. Dissertations must be formatted in accordance with University and Graduate School requirements, and all changes suggested by the doctoral committee must be made in the final version. The results of the dissertation research should be submitted to a refereed journal.

Graduate Assistantships

Overview

Research Assistantship (RA)

A Research Assistantship (RA) is a part-time professional appointment to assist a faculty member in a specific research project. The faculty specifies the work to be accomplished by the RA during the appointment. There is a wide latitude in the types of work an RA may do for the research effort, and the time spent in various aspects may vary widely. As a guide, a half-time appointment should average about 20 hours per week, with other fractional appointments in proportion.

Teaching Assistantship (TA)

A Teaching Assistantship (TA) is a part-time professional appointment. A Teaching Assistant provides professional assistance as either a grader or as a laboratory assistant. The GSC and the Associate Director make TA assignments.

The TA is expected to report to the School of EECS, one week prior to START of classes; if he/she fails to do so, the assistantship will be revoked. The TA's responsibilities are not completed until final grades for the course have been assigned, unless excused earlier by the instructor.

Eligibility

Students who are enrolled in a Ph.D. or M.S. thesis program within the School of EECS are eligible for Research Assistantships (RA). Only Ph.D. students are eligible for Teaching Assistantships (TA); no M.S. students is eligible for a TA. Those enrolled in M.S. non-thesis programs are **not eligible for any kind of** assistantship.

Incoming students and prospective students are automatically considered for assistantship positions at the time that their application for admission is being evaluated. Assistantships will be awarded to incoming students based upon the strength of their application, faculty interest, and funds availability. If an assistantship is not awaded for the first semester of graduate work then they student may request support for subsequent semesters; these funding decisions will be made by the student's principal investigator.

Expectations

Work Assignments and Course Loads

Students supported on assistantship are expected to be available for performance of their duties beginning one week prior to classes through the date grades are due at the end of the semester. Assistantships require a work commitment of about 20 hours per week.

Graduate assistants are required to choose the thesis option and must register for 10-12 credit hours. This total includes graded course work, and research hours.

Grading Assistance

A TA assigned as a grader may review, critique, and grade problem sets, exercises, reports, examinations and other written or oral material. A grader may assist in preparing programs, problem sets, and contribute to examination sets.

Laboratory Assistance

The lab TA assists in the laboratory by interpreting the laboratory instructions, demonstrating proper use of equipment and supplies, answering students' questions, encouraging students to perform quality work and investigating odd or unexpected results. The TA may aid in preparing experiments and exams, performing demonstrations, preparing and grading reports and examinations.

Laboratory assistance may include helping students learn computer techniques.

Tuition Waivers

All graduate students admitted to the Pullman, Spokane, Tri-Cities, or Vancouver campuses who have been awarded a teaching, research, or staff assistantship of one-half time (0.50 FTE) or more may qualify for waivers of the non-resident and/or resident tuition.

1. To qualify for a resident or non-resident tuition waiver, students must reside in the State of Washington.

2. For newly admitted students who are U.S. citizens or permanent residents but who are not residents of Washington state, non-resident waivers are available but cannot be guaranteed beyond one year.These students should contact the Graduate School for information regarding residency requirements and establishing residency.

3. To qualify for the non-resident or resident tuition waiver, appointments must be for the full semester or for the full academic year. If an appointment terminates during the semester a graduate student may lose all waivers and be responsible to pay the tuition

4. Waivers do not cover mandatory graduate student fees. Graduate students on an assistantship will be responsible to pay the mandatory student fees each semester, as well as well as a small portion of the tuition due that cannot, by law, be waived. For students on a half time assistantship with full waivers, the amount to be paid for the current semester can be found at http://gradschool.wsu.edu/facultystaff-resources/712-2/.

5. The Graduate School does not provide tuition waivers to offset tuition for students admitted to Global Campus programs. Students wishing to participate in special scholar programs in which tuition waivers are granted by the Graduate School must be admitted to a Pullman, Spokane, Tri-Cities, or Vancouver-based program to be eligible for the tuition waiver.

6. The Graduate School does not provide tuition waivers during the summer; however graduate students on assistantships during the summer session may qualify for a teaching assistantship (TA) tuition waiver through the Summer Session Program or a qualified tuition reduction (QTR) through a non-state-funded assistantship appointment.

Required Research Training for Graduate Assistants

RCR Training
Mandatory training on the Responsible Conduct of Research is required of all graduate students, and it is a service requirement for graduate assistants.

This is a web-based training located at http://myresearch.wsu.edu. Students should take this training as soon as possible, and will need to retake it after a five-year period. Students are not eligible for an assistantship until the training is complete. A grace period of one semester will be granted for international students who have not taken the training at the start of their assistantship. If the assistantship for the subsequent semester is processed late due to the student not completing the training in a timely manner, the student will be responsible for paying all late fees applied to the student's account and may lose their eligibility for the assistantship.

ITA Exam
Students who are required to submit TOEFL exam scores upon admission are required to take the International Teaching Assistant (ITA) exam in order to receiving a Teaching Assistantship (TA). Students must sign up for the ITA exam here: https://ip.wsu.edu/learn-english/teaching-assistant-evaluations/

The EECS departmental representative is Andrew O'Fallon, whose contact information is:
- Email: aofallon@eecs.wsu.edu
- Phone: 509-335-1777
- Office: EME 125

Assistantship Stipends
Stipends for full-time and half-time (monthly and nine-month) graduate assistantship appointments are flexible. An Assistantship Stipend Guide is available to departments on the Graduate School website at http://gradschool.wsu.edu/assistantships/. Graduate assistants who qualify also receive a health insurance benefit. Information about the health benefit can be found at

http://studentinsurance.wsu.edu/graduate-assistants/.

For the 2017-2018 school year, graduate students on assistantship with EECS will be paid according to the following:

- M.S. students and Ph.D. students who have not yet passed their Qualifying Exam (QE) will be paid at salary step 53 ($2057/mo).
- Ph.D. students who have passed their Qualifying Exam (QE) will be paid at salary step 60 ($2207/mo).

Assistantship Renewal

Assistantships are assigned on a per-semester basis and students must apply to renew their assistantship each semester. Assistantship renewal is contingent upon available funding as well as meeting the minimum conditions for reappointment, as listed below.

Minimum Conditions for Reappointment

The department has established the following criteria as the minimum standard for reappointment.

- Satisfactory progress in research as determined by research advisor.
- (Teaching Assistants only) A minimum cumulative GPA will be set every semester depending upon the pool of applicants who are competing for the open positions.
- Satisfactory progress in course work as determined by the student's advisory committee and/or the graduate coordinator.
- (Teaching Assistants only) Satisfactory performance as a TA as determined by faculty supervisor and students assessments of TA performance (if available).
- (Teaching Assistants only) Passage of TA oral English exam (for non-native English speaking students) (ITA).

Termination of Assistantship

- Unsatisfactory performance of duties as a teaching or research assistant.
- A semester GPA below 3.00 at any time or a semester GPA between 2.5 and 3.0 for more than one semester.
- Failure to file a Program of Study by required date.
- Violation of academic integrity policy.
- Failure to pass the TA oral English exam (for non-native English speaking students).

Changing Assistantship Type and/or Changing Faculty Advisors

Students can switch from a TA position to an RA position if they find a suitable research project and arrangements are made with the principal investigator in charge of that research project. The process to change assistantship type is:

- The PI/Faculty Advisor must write a memo of support to the Graduate Coordinator, agreeing to support the student.
- The Graduate Studies Committee will review the memo and either approve or deny the request.
- All requests to change assistantship type must be made prior to the appointment period of the subsequent term.

A student holding an RA position can be switched from an RA to TA per the following process:

- The PI/Faculty Advisor must write a memo of support to the Graduate Coordinator, detailing the circumstances of the termination of the RA and support of the student's capabilities to perform as a TA
- The Graduate Studies Committee will review the memo and either approve or deny the request.
- All requests to change assistantship type must be made prior to the appointment period of the subsequent term.

Graduate School Requirements, Policies, and Procedures

In addition to EECS policies, students are expected to abide by the Graduate School requirements, policies, and procedures as outline in the Graduate School Policies and Procedures Manual, found here: https://gradschool.wsu.edu/policies-procedures/