



**GRADUATE DEGREE PROGRAMS  
in  
COMPUTER SCIENCE AND ENGINEERING**

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# 1. OVERVIEW OF THE CSE GRADUATE PROGRAMS

**At the Graduate Level:** All graduate CSE degrees are offered under the rules of the Rackham School of Graduate Studies. This document covers the CSE graduate degree programs – the master’s degree program, and the doctoral degree program.

**The CSE Graduate Committee** is the governing committee for all CSE academic degrees and students. The CSE graduate programs fall under the College of Engineering (CoE) Honor Code. Please see the CoE website for details (<http://www.engin.umich.edu/>).

## 1.1 Terminal M.S./M.S.E. Degree Program in Computer Science and Engineering

The master’s degree program is administered by the Computer Science and Engineering division of the department of Electrical Engineering and Computer Science. In addition to completing the requirements of the CSE graduate program (covered in this document), a student must also satisfy the regulations of the Rackham School of Graduate Studies and the College of Engineering. For details, see the Rackham website (<http://www.rackham.umich.edu/>).

The M.S. and M.S.E. degree programs are identical except for admission requirements. Students desiring admission to the M.S.E. program must have an earned bachelor’s degree in computer engineering. Application procedures and the principle requirements for the M.S.E. and M.S. degree programs are described in detail on CSE’s web pages: <http://www.eecs.umich.edu>.

A student must earn at least 30 credit hours of graduate-level coursework, at least 24 hours of which must be technical courses. At least 15 hours must be CSE coursework at the 500-level or above (excluding credit hours earned in individual study, research or seminar courses). The student must also satisfy course requirements in “breadth” areas of software, hardware, artificial intelligence and theory. A maximum of six (6) credit hours of individual study, research and seminar courses will be accepted toward the master’s degree. The VLSI/CAD concentration has different course requirements. It usually takes 1 1/2 to 2 years to complete the master’s degree (3-4 full terms).

The Program requires that the Grade Point Average received in CSE coursework must be at least 3.0 based on Rackham’s 4.0 scale. An individual course grade of B- or better is required for the credit hours received in any course to be counted towards any master’s degree requirement. A master’s thesis is optional. Credit hours transferred may be applied to meet any master’s degree requirement except the 15 credit hours of 500 level CSE coursework required. (Rackham specifies limitations to the circumstances under which credits may be transferred. See the *Rackham Graduate School Academic Policies*: <http://www.rackham.umich.edu>.) Courses of an insufficiently advanced level, or which substantially duplicate in level and/or content courses already completed by the student, may not be counted as meeting any master’s degree requirements.

## 1.2 Ph.D. Degree Program in Computer Science and Engineering

The doctoral degree in Computer Science and Engineering is conferred by the Rackham Graduate School in recognition of marked ability and scholarship in some relatively broad field of knowledge, plus the demonstrated ability to carry out independent research yielding significant original results.

The doctoral program proceeds in three stages: (1) qualification (see Section 6.1); (2) candidacy (there are both departmental and Rackham requirements for achieving candidacy); and (3) dissertation (writing and defense of the dissertation). Candidacy signifies that course work is essentially completed and some research has been started. Successful completion and defense of the doctoral dissertation marks the completion of the requirements for the Ph.D. degree.

## 2. INTERNET RESOURCES

The *Rackham Student Handbook* and the *Engineering College Bulletin* are among the numerous UM publications available online. The *Rackham Student Handbook* gives details about the Ph.D. degree requirements imposed by the Graduate School, and should be consulted by all Ph.D. students, particularly in regard to questions about continuous enrollment, fees, cognates, etc. All EECS course descriptions are available online at: <http://cse.engin.umich.edu/academics/course-information>

The EECS website is: <http://eecs.engin.umich.edu>

The Rackham website is: <http://rackham.umich.edu>

The College of Engineering website is: <http://engin.umich.edu>

## 3. CSE TERMINAL MASTER'S DEGREE PROGRAM

### 3.1 Requirements: M.S./M.S.E. Degree Program (Terminal Master's Degree)

A CSE Terminal Master's student may earn a CSE M.S./M.S.E. degree by successful completion of the following:

- (1) The Rackham requirements;
- (2) The Master's Breadth Requirements including both course and grade requirements;
- (3) The required 30 hours of graduate level credit, which must include:
  - (a) at least 24 credit hours of approved graduate-level technical courses;
  - (b) at least 15 credit hours of CSE technical courses at the 500 level or above
  - (c) up to six credit hours of seminar courses (e.g., EECS 598) and directed study courses, special topics, etc. (e.g., EECS 599).

Courses of insufficiently advanced level, or which substantially duplicate in level and content courses already completed by the student may not be counted as meeting any degree requirement.

400-level special topics (EECS 498), independent study (EECS 499), and MDE courses (EECS 496/497, 441, etc.) are not considered graduate-level technical courses for CSE students. For a list of graduate-level CSE courses see the attachment "EECS Courses".

EECS 598 (Special Topics) courses intended to become regular CSE technical courses may be approved by the Graduate Program Committee to count under category (3b) rather than (3c). These are determined on a case-by-case basis.

EECS 699 (Research Work in EECS) credits will not count toward the CSE Terminal Master's degree program.

An individual course grade of B- or better is required for the credit hours received in any course to be counted towards any master's degree requirement. Rackham requires the overall GPA among all courses applied to the master's degree to be at least 3.0 based on Rackham's 4.0 scale. In addition to this, the CSE Program requires that the Grade Point Average received in CSE coursework must be at least 3.0 based on Rackham's 4.0 scale. (No letter-graded courses taken as S/U may be used toward any degree requirement.)

Students who enter without an undergraduate engineering degree receive an M.S. degree. Students who enter with an undergraduate engineering degree have a choice of either the M.S. or M.S.E. degree.

### **3.1.1. M.S./M.S.E. Breadth Requirements (Terminal Master's Degree)**

The CSE Master's degree program requires students to complete certain "master's breadth" course requirements. The purpose of the breadth requirement is to give the student broad training in the major areas of computer science and engineering.

Students must complete one breadth course (in some cases, two courses) in each of the following technical areas:

- a) Hardware: EECS 427, EECS 470, EECS 473, EECS 478, EECS 527, EECS 570, EECS 573, EECS 577, EECS 578, EECS 579, EECS 583, EECS 627
- b) Artificial Intelligence: EECS 543, EECS 545, EECS 592
- c) Software (must complete one 500-level, or two 400-level, courses from this list): EECS 482, EECS 483, EECS 484, EECS 485, EECS 487, EECS 489, EECS 490, EECS 571, EECS 582, EECS 583, EECS 584, EECS 587, EECS 588, EECS 589, EECS 590, EECS 591
- d) Theory: EECS 574, EECS 575, EECS 586

### **3.1.2. The VLSI/CAD master's kernel differs from the other areas as follows:**

VLSI/CAD students are required to take both EECS 427 and EECS 627.

In addition, students must complete two of the four master's kernel options listed above (a, b, c, or d). However, EECS 427 and/or EECS 627 cannot be used to fulfill the hardware kernel option. One of the chosen 500-level courses must be from the following list: EECS 522 or EECS 523, EECS 527, EECS 578, EECS 579.

### **3.1.3. Technical Coursework**

A "technical course" is a lecture based class that requires a rigorous combination of homework, exams and/or projects (i.e., not an individual study, research, or seminar course). The course must be an established course that conveys a specified body of material, taught by a regular EECS faculty member and approved for Rackham graduate credit.

### **3.1.4. Course Equivalency**

Courses taken at another university that are equivalent in level and content may be used to fulfill one or more of the breadth course requirements provided the student is awarded equivalency for that course. In general, equivalency does not fulfill any other degree requirements, in particular, credit hour requirements. Forms to request equivalency, including the instructions/procedures, and are available in the CSE Graduate Programs Office or at the end of this document.

### **3.1.5. Transfer of Credit**

Credit hours transferred may be applied to meet any master's degree requirements except the 15 credit hours of 500 level or above CSE coursework. Rackham specifies limitations to the circumstances under which credits may be transferred.

See the *Rackham Student Handbook* at: <http://www.rackham.umich.edu>

### **3.1.6. Master's Thesis Option**

The option of writing a Master's thesis is available to master's students in good academic standing. A student wishing to exercise this option may initiate the process by taking the following two steps. He/she must: a) find a CSE faculty member willing to serve as thesis advisor; b) enroll under the master's thesis

course number (EECS 698) for one to six credit hours. (EECS 698 will not count for technical credit hours.) These credit hours may be spread over more than one term, and are graded on an S/U basis.

The thesis advisor is responsible for supervising the work of the master's thesis project, and choosing the master's thesis committee. This committee shall consist of the thesis advisor who serves as chair, and two additional faculty members, and must be approved by the CSE Graduate Program Committee. At least two of the three thesis committee members must be a regular CSE faculty (CSE tenure-track faculty with at least a 50% appointment in CSE).

The student must write and deposit with the department a written thesis whose format is substantially consistent with the Rackham format requirements for theses. An oral presentation and defense of the thesis before the thesis committee is also required. Each member of the thesis committee must submit a written report on the thesis, and approval of the thesis by all members is required.

### **3.2. Academic Advising**

A list of CSE faculty currently serving as master's advisors will be provided to incoming master's students prior to the first day of fall term classes. Each student must contact a faculty member from that list for advice and approval of the master's plan of study.

### **3.3. Masters Plan of Study**

In consultation with the advisor, each student must submit a "Master's Plan of Study" (approved by his/her academic advisor) during the first term of enrollment. This plan must contain a listing of the courses the student intends to take to satisfy the degree requirements and must constitute a coherent program at an appropriate level. The Master's Plan of Study is intended as a guide to the student and program advisor. **Final responsibility for ensuring that degree requirements are satisfactorily met rests with the student.** Forms are available in the CSE Graduate Programs Office or at the end of this document.

## **4. APPLYING TO GRADUATE WITH THE MASTER'S DEGREE**

At the beginning of the term in which you expect to receive your master's degree, you will need meet with the CSE Graduate Coordinator and review your academic record. To do so you need to bring: a) a copy of the confirmation of graduation application; b) an approved and current Master's Plan of Study signed by a CSE faculty master's advisor (if an up-to-date version is not already on file in the CSE Graduate Programs Office). This form may be found at the end of this document or obtained from the CSE Graduate Programs Office.

You must have this meeting for your degree to be processed (please do not hand in the forms without meeting with the Graduate Program Coordinator). You must complete the above procedure by at least one week before the posted Rackham deadline for submission.

## **5. TRANSFERRING FROM TERMINAL MASTER'S TO Ph.D. PROGRAM**

Students currently in the terminal master's who wish to transfer to the Ph.D. Program should submit an application for admission to the Ph.D. Program. The deadline for applying for Fall Term is December 1st of the previous year. General information about the application process, including a link to the Rackham online application site, is available at <http://www.cse.umich.edu/eecs/graduate/cse/apply/>. You will need to submit the application, a statement of purpose, and arrange for letters of recommendation.

As you are already in the terminal master's degree program, it is expected you will have recommendation letters from Michigan faculty. Furthermore, your application must be sponsored by a particular CSE faculty member who has advised you on a substantial research project and is willing to supervise your Ph.D. research. Your application will be evaluated on the overall record, with special attention to performance in the CSE M.S./M.S.E. program and demonstrated research potential at Michigan.

## 6. CSE Ph.D. DEGREE REQUIREMENTS

### 6.1. CSE Ph.D. Requirements Overview

Students should note the general requirements for graduate studies stated on <http://www.rackham.umich.edu> as well as the requirements stated in this brochure. It is the student's responsibility to ensure that all requirements are satisfactorily met.

A student earns a CSE Ph.D. in three stages:

(1) **Qualification** for the CSE Ph.D. requires the following:

- Breadth Coursework
- Depth Coursework
- Directed study Coursework/Research
- Preliminary Examination
- Reciprocal working relationship with an EECS Faculty member (research advisor)

(2) **Candidacy** for the Ph.D. requires the following:

- Successful qualification in the CSE Program;
- Completion of all Rackham requirements for Candidacy, including the 4-hour cognate requirement. (Beginning Fall 2014, Rackham requires that all Responsible Conduct of Research and Scholarship (RCRS) requirements must be met before candidacy).

(3) **Dissertation** and defense:

- Identify a research advisor, and agree on a topic;
- Identify a doctoral committee;
- Submit and defend a proposal for the content of the doctoral research;
- Do the research and write the dissertation;
- Submit and defend the dissertation.

### 6.1.1. Ph.D. Timetable

These are guidelines/deadlines for maintaining normal progress toward the degree. To stay in the Ph.D. program after a \* deadline requires a petition (with advisor's approval) and a waiver from the CSE Graduate Program Committee.

Number of full semesters after entry when you are expected to have achieved a particular milestone in the program.  
(\* = waiver required from Grad Program Committee to continue)

	Enter Without Relevant Masters	Enter With Relevant Masters
Entry	0	0
Quals	4*	3*
Candidacy	5(6*)	3(4*)
Proposal	7*	5*
Defend	12*	10*

Prelim exams (part of Qualls) are scheduled only in mid-September, mid-January, and mid-May.

#### CSE Ph.D. Deadlines

Entering with Bachelor's	Entry Date	Entry Date	Entry Date	Entry Date	Entry Date	Entry Date	Entry Date
	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Fall 2022	Fall 2023
Quals	May 2019	May 2020	May 2021	May 2022	May 2023	May 2024	May 2025
Candidacy	May 2020	May 2021	May 2022	May 2023	May 2024	May 2025	May 2026
Thesis Proposal	December 2020	December 2021	December 2022	December 2023	December 2024	December 2025	December 2026
Completion	May 2023	May 2024	May 2025	May 2026	May 2027	May 2028	May 2029

Entering with Master's	Entry Date	Entry Date	Entry Date	Entry Date	Entry Date	Entry Date	Entry Date
	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Fall 2022	Fall 2023
Quals	December 2018	December 2019	December 2020	December 2021	December 2022	December 2023	December 2024
Candidacy	May 2019	May 2020	May 2021	May 2022	May 2023	May 2024	May 2025
Thesis Proposal	December 2019	December 2020	December 2021	December 2022	December 2023	December 2024	December 2025
Completion	May 2022	May 2023	May 2024	May 2025	May 2026	May 2027	May 2028

### 6.1.2. Qualification

Qualification is based on all of the following which must be successfully completed by each student's individual qualification deadline. A Ph.D. student must have a 3.5 GPA overall and a 3.5 GPA for all CSE courses to sign up for the qualification exams.

#### 6.1.2.1. Ph.D. Breadth Coursework

**Breadth:** Three courses from three different technical areas, drawn from a specified list of technical areas and approved courses (attached), completed with a grade of B+ or better. Equivalency is possible.

Courses selected to fulfill the CSE Ph.D. Breadth requirement may not also be used to fulfill the CSE Ph.D. Depth requirement. All Ph.D. breadth courses must be completed with a grade of B+ or better within 3 full terms (1 1/2 years) for a student with a relevant Master's degree and 4 full terms for all other students. Courses taken at another university that are equivalent in level and content may fulfill one or more of these requirements. A list of approved courses may be found at the end of this document, in the appendix.



### 6.1.2.2. Ph.D. Depth Coursework

**Depth:** Two courses from a specified list of courses (attached), including at least one "star" course, completed with a grade of A- or better. These courses may not be completed via equivalency.

The "Depth" coursework requirement is designed to ensure that students complete graduate-level coursework relevant to their chosen area of specialization and acquire the core research skills and knowledge of the literature relevant to this specialization. Students must complete 2 courses, achieving a minimum grade of A- in each. These courses may **not** be completed via equivalency. At least one of the courses must be a "star" course, marked with an asterisk in the list appearing at the end of this brochure. The selected courses must be approved by the student's research advisor; a signed Depth Course Approval form must be submitted when signing up for the qualification exam (by the deadline). A list of approved courses may be found at the end of this document, in the appendix.

### 6.1.2.3. Directed Study and Research Potential

A commitment from an approved EECS Faculty to act as one's research advisor is a requirement of qualification.

A Ph.D. aspirant must demonstrate potential for conducting original research. This may be accomplished by completing at least three hours of research-oriented directed study (EECS 699) prior to the Preliminary Exam. These must be taken as a Rackham CSE student at UM. (Alternatively, this requirement may be satisfied by six credit hours for a UM CSE Masters Thesis - EECS 698.)

A Ph.D. student must complete at least one of the three required credits of EECS 699 (directed study) within their first two terms of the Ph.D. program, or have their academic or research advisor sign a waiver of this requirement. Students must submit a form documenting their directed study/waiver by the course registration Drop/Add deadline of their second semester.

During their first summer in the Ph.D. program, students are required to remain resident in Ann Arbor and perform independent research in collaboration with a CSE faculty member. The intent of this summer research requirement is to provide adequate opportunity for students to work closely with a research advisor to prepare to take the qualifying exam before their qualification deadline. The first-year summer research/residency requirement is a condition of continued departmental financial aid guarantees and can be waived only by petition to the graduate program committee with an explanation of special circumstances (e.g., a research-oriented internship directly relevant to the student's qualifying exam preparation) endorsed by the student's academic or research advisor. This requirement does not apply to students who transfer from a terminal M.S. to the Ph.D. program more than one calendar year after entering the M.S. program.

### 6.1.2.4. Preliminary Examination

**Preliminary Exam:** Research readiness is evaluated through a written report of a project done in a research-oriented directed study, followed by a 90 minute oral exam by three faculty members not including one's research advisor.

The Preliminary Examination (Prelim) is a major component of the Ph.D. qualification process. Each student will be given an oral examination on the student's directed study project and on material directly related to the student's research area. This examination will be administered during the qualification examination period in mid-January, mid-May or mid-September. The examination will be given by three faculty members selected by the CSE Graduate Program Committee. None will be the director of the

students' directed study project. Examiners will be given the written report on the directed study at least one week before the examination, and each examiner will submit a written report on the examination. The student must submit four copies of the written report to the CSE Graduate Coordinator at least one week before the qualification exams begin.

The Preliminary Exam is scheduled for a 90 minute time slot. The student presentation should aim for 50 minutes or less, with the other 40 minutes for questions.

Once all the above requirements for Qualification have been met, a decision whether the student is qualified to continue in the Ph.D. program is made by vote of the CSE faculty.

#### **6.1.2.5. Academic Probation and Dismissal of Doctoral Students for Academic Reasons**

At the end of each academic term, the CSE Graduate Committee will review current progress of CSE Ph.D. students. The committee will consider the following: academic progress through the degree program; cumulative GPA; and research progress (one component of which is having a research advisor). As part of the review, the Graduate Committee can decide to place a student on academic probation. If such a decision is made, the student will be notified via email of the academic probation decision details (reason, duration, conditions, and appeal process) before the probationary period begins, and it will also be noted on the transcript.

If placed on probation at the end of the fall term, probation will be at least for two months in the winter term. If placed on probation at the end of the winter term, probation will be at least for two months in the spring/summer term. It is up to the Graduate Committee to determine the appropriate length, which can be longer than two months. The level of funding prior to probation will continue through the probationary period.

A student who has been placed on academic probation may request a leave of absence from Rackham or withdrawal. The leave or withdrawal will stop the clock on the probationary period, which resumes when the student returns to active status or is reinstated. Probation will remain in effect until the conditions are remedied or the student is dismissed. During the probationary period, a student may be evaluated by the Graduate Committee as having unsatisfactory academic standing, which will remove the guarantee of financial aid going forward.

At the end of the probationary period, the Graduate Committee will evaluate the student's progress and, with consent of the Graduate School, decide whether the student will: remain on probation (and be notified as to the reason, duration, conditions, and appeal process as described above); no longer be on probation (and return to satisfactory academic standing if previously determined to have unsatisfactory academic standing); or be dismissed from the program.

The student has the option to appeal academic probation or dismissal. In this case, the CSE Graduate Chair will appoint a separate committee of three CSE faculty to hear the appeal. The committee will not include members of the CSE Graduate Committee or the student's advisor.

Students may also be dismissed for failure to successfully complete qualification within their deadlines. Such dismissal does not include any probationary period.

Students who fail to meet standards of academic or professional integrity, or who have been found responsible for violations of other University standards of conduct, may be dismissed in accordance with separate procedures described in the Rackham Academic and Professional Integrity Policy.

### 6.1.3. Candidacy

The decision to advance a student to Candidacy is based on the following factors:

1. Successful completion of the CSE Qualification process.
2. Fulfillment of all Rackham candidacy requirements (e.g. cognate coursework, RCRS, etc.)

A student may satisfy the Ph.D. cognate requirement (at least 4 hours of graduate-level course work) by taking course(s) associated with another EECS program (not his/her own), by taking course(s) outside the department, or by a mixture thereof. Courses taken from other programs cannot overlap in content with any CSE course related material. Any course in question must have prior approval of the CSE Graduate Program Committee.

**To become a "Candidate"**, a student must have been declared "qualified" by the CSE Program, and must have satisfied all of the CSE Program's and Rackham's candidacy requirements (beginning Fall 2014, Rackham requires that all RCRS requirements are met before candidacy). A student must apply for candidacy by submitting the "CSE Candidacy Checklist" via the CSE Graduate Office. These requirements and the form must be submitted before the term before you plan to become a candidate. Candidacy is not awarded automatically; it must be applied for.

The achievement of candidacy is considered an important milestone in a Ph.D. student's progress, and all students are expected to apply for candidacy as soon as they are eligible. A student with a relevant Master's degree is making satisfactory progress if candidacy is achieved within 3 full terms (1.5 years), and must be achieved within 4 full terms (2 years). Other students are making satisfactory progress if candidacy is achieved within 5 full terms (2.5 years), and must be achieved within 6 full terms (3 years). A student without adequate undergraduate coursework in CSE may petition for an extension to these deadlines; however, that petition must be made to the Graduate Program Committee before the end of the first term of study.

### 6.1.4. Dissertation Committee

Soon after advancing to candidacy, the candidate and his or her advisor should form a Dissertation Committee and submit it to the CSE Graduate Programs Office for preliminary approval by the CSE Graduate Committee. The CSE form to request approval is available on the CSE Graduate website: [https://www.cse.umich.edu/eeecs/graduate/cse/cse\\_current.html](https://www.cse.umich.edu/eeecs/graduate/cse/cse_current.html).

This request form must be first approved by the student's chair (or co-chairs). Once approved by the CSE Graduate Committee, it will be forwarded to the Rackham Graduate School for final approval. Typically the research advisor serves as chair (or as a co-chair) of this committee. It is the responsibility of the student and the advisor to find eligible faculty members willing to serve.

Membership in the committee is determined by Rackham guidelines as listed at <https://www.rackham.umich.edu/downloads/oard-dissertation-committee-guidelines.pdf>, as well as CSE-specific guidelines included below.

Dissertation committees must have at least four members, three of whom are members of the Graduate Faculty (see Rackham's guidelines for details). Further requirements on the committee:

1. Must have a sole chair or two co-chairs. Sole chairs, or at least one co-chair, must be a CSE faculty with 0% or greater appointment, and must be Tenure-track faculty, Research Professor, Research Associate Professor, or emeriti Professor.
2. One member of the committee must be a CSE faculty (in the positions listed above) with at least 50% appointment in CSE, and a second member must have a CSE (in the positions listed above) appointment exceeding 50%.
3. One member of the committee must be a cognate member who holds at least a 50% appointment in a Rackham doctoral program, other than CSE. A faculty member with a 50% or greater CSE

appointment may not serve as the cognate member of the committee. A person cannot serve as a cognate if they are a chair or co-chair of the committee.

4. May include a University faculty member who is not Graduate Faculty, a University staff member, or a qualified individual outside the University to provide expertise in the candidate's discipline, as long as they meet all Rackham requirements.

The Dissertation Committee is responsible for reviewing the student's progress, including the thesis proposal and the final dissertation. The dissertation committee must be approved prior to the thesis proposal date.

### 6.1.5. Thesis Proposal

After a student achieves candidacy, a thesis (dissertation) proposal must be successfully completed by a candidate within 7 full terms (3.5 years) from the start of graduate study to maintain satisfactory progress. A student with a relevant master's degree must complete a thesis proposal within 5 full terms (2.5 years). The thesis proposal will be administered by the Dissertation Committee (see above). The student will submit a dissertation research proposal to the Dissertation Committee at least two weeks in advance of the date of an oral presentation. In the written proposal, the student must precisely identify the intellectual area in which he or she intends to pursue research and must demonstrate an in-depth understanding of that area. The student must give a general description of the research problem to be addressed and an outline of the approach that will be taken. It is desirable that the research problem be specified in considerable detail and that some initial results be presented. During the oral presentation, the student will present the proposed dissertation research, including relevant background material and preliminary research results. During and after the presentation, the Dissertation Committee will explore the research area with the student to determine whether the student has completed this phase successfully. The Dissertation Committee will prepare a written report on the outcome of the proposal presentation, and a copy of the written proposal will be placed in the student's file.

### 6.1.6. Dissertation and Final Defense

After the thesis proposal has been approved, the candidate may proceed with the thesis research and the writing of the dissertation. Upon completion, the dissertation must receive a written evaluation from each member of the Dissertation Committee and must be defended orally in an open examination (the Final Defense) before the Committee, in accordance with Rackham rules. The thesis defense may not be scheduled in the same academic term as the thesis proposal. (<http://www.rackham.umich.edu>)

## 6.2. Ph.D. Research Advisor

An incoming graduate student will be assigned an *academic* advisor (a regular faculty member in the CSE program) in his/her area of interest. Students already in the CSE master's degree program may continue with the same academic advisor. The academic advisor will assist the student with meeting the academic requirements of the degree.

A student's *research* advisor, chosen through **mutual agreement** between the student and the faculty member, will guide and counsel the student on the research and academic planning for, and completion of, the Ph.D. degree.

The advisor (academic and/or research) may subsequently change by mutual agreement. (Forms are available on the CSE Program Website or in the CSE Graduate Office.)

If the research advisor is a regular tenure-track CSE Faculty, they may assume the role of both research and academic advisor. If your research advisor is outside of the CSE regular faculty, the CSE faculty academic advisor will remain.

A commitment from a CSE tenure-track faculty to act as a research advisor is a requirement of qualification/candidacy and satisfactory progress toward the degree.

### **6.3. CSE M.S./M.S.E. Degree Requirements for CSE Ph.D. Students**

A CSE Ph.D. student (entering without a relevant master's), has the option of earning a CSE MS/MSE degree by completion of the following:

- (1) Completing the Rackham requirements for the master's;
- (2) Completing the Breadth and Depth requirements of the CSE Ph.D. program, including both course and grade requirements;
- (3) Filling out the required 30 hours of graduate level credit with some combination of approved graduate-level technical courses and research credits, i.e. EECS 699.

400-level special topics (EECS 498), independent study (EECS 499), and MDE courses (EECS 496/497, 441, etc.) are not considered graduate-level technical courses for CSE students. For a list of graduate-level CSE courses, see the attachment "EECS Courses".

A typical Ph.D. Student will take 5 courses (15-20 credits) to complete the Ph.D. Breadth/Depth requirements and fill the remaining credit hours through Ph.D.-oriented research (EECS 699).

An individual course grade of B- or better, is required for the credit hours received in any course to be counted towards any master's degree requirement. Rackham requires the overall GPA among all courses applied to the master's degree to be at least 3.0 based on Rackham's 4.0 scale. In addition to this, the CSE Program requires that the Grade Point Average received in CSE coursework must be at least 3.5 based on Rackham's 4.0 scale. (No letter-graded courses taken as S/U may be used toward any degree requirement.)

Students who enter without an undergraduate engineering degree receive an M.S. degree. Students who enter with an undergraduate engineering degree have a choice of either the M.S. or M.S.E. degrees.

## **7. NON-DEGREE (NCFD) STUDENTS**

The CSE Division will occasionally admit qualified students who are not candidates for a degree (NCFD students) to enable them to take graduate courses. Such students typically have a full-time job in a local industry or business in Southeastern Michigan and take relatively few courses. A student who is interested in a graduate degree program is strongly encouraged to apply as a regular graduate student, and not as an NCFD student. Note that courses taken by a student under NCFD status may *not* be subsequently used for a graduate degree. NCFD status is only granted for one term at a time.

## **8. POLICY FOR DROPPING COURSES**

The Registrar's Office and the Rackham Graduate School determine the policy for dropping courses. Courses may be dropped or changed to Visit status only under exceptional circumstances and with the approval of the course instructor, advisor, and the graduate chair of the program. The specific student registration deadline dates are posted on the Registrar's Office website (<http://ro.umich.edu/calendar>). The Rackham Graduate School rules for dropping courses also apply (see the *Rackham Student Handbook* <http://www.rackham.umich.edu>).

## 9. ADDITIONAL INFORMATION AND FORMS

Various current forms such as the CSE Graduate Courses list, the master's degree plan of study, etc. are also available on the CSE Graduate Website:

[http://www.cse.umich.edu/eecs/graduate/cse/cse\\_current.html](http://www.cse.umich.edu/eecs/graduate/cse/cse_current.html)

### **Forms included:**

#### ***For Terminal Masters Students:***

- CSE Terminal Masters Plan of Study
- CSE Terminal Masters Plan of Study in VLSI

#### ***For Ph.D. Students:***

- First Year Directed Study Requirement Form
- CSE Candidacy Checklist for the Ph.D. Program
- CSE Ph.D. Student Masters Plan of Study
- CSE Dissertation Committee Request Form

#### ***For All Students:***

- CSE Petition Request Form
- Request for Equivalency
- Notification of Advisor and/or Area Change
- EECS Course List

## CSE TERMINAL MASTERS PLAN OF STUDY

(must take breadth courses in all 4 areas listed below)

\_\_\_\_\_  
Advisor (signature required)

Name: \_\_\_\_\_ UMID: \_\_\_\_\_

\_\_\_\_\_  
Date

MSE Degree    or    MS Degree (circle one) \_\_\_\_\_

\_\_\_\_\_  
Degree Term:

(What is your undergrad degree field? (engineering or non-engineering) \_\_\_\_\_

Term	Course	Grade	Credit Hours At least 30 credit hours	Technical Electives: at least 24 credit hours	CSE Courses 500 level or above at least 15 credit hours	(Two of 400 level: 482; 483; 484; 485; 487; 489; 490 or 571 or 582 or 583 or 584 or 587 or 588 or 589 or 590 or 591 (Software))	592 or 543 or 545 (Artificial Intelligence)	427 or 470 or 473 or 478 or 527 or 570 or 573 or 577 or 578 or 579 or 583 or 627 (Hardware)	574 or 575 or 586 (Theory)
	Total Hours: (fill in for each column)								

**NOTES:**

- 1) A maximum of six credit hours of individual study, research, and seminars
- 2) You must meet all Rackham and Program requirements (see brochures for details)
- 3) It is expected that most entering students will have already completed courses equivalent to (482 or 483) and 492 and (470 or 478)
- 4) Seminar, directed study credits (except 3 hrs. of EECS 599) do not count toward the 500 level course requirement
- 5) It is the student's responsibility to see that all requirements are met.
- 6) If you already have a masters degree from another institution that has been deemed relevant by CSE you are not eligible for a masters degree from this program.

For office use only:						
No grades below B- _____						Term _____
Approved MPS _____						
Other, Masters thesis, TC, _____						
MSE	MS	_____ GPA			_____ CTP	

# CSE TERMINAL MASTERS PLAN OF STUDY in VLSI

Name: \_\_\_\_\_ UMID: \_\_\_\_\_

Advisor (signature required)

Date \_\_\_\_\_

MSE Degree or MS Degree (circle one)

Degree Term: \_\_\_\_\_

(What is your undergrad degree field? (engineering or non-engineering) \_\_\_\_\_)

Term	Course	Grade	Credit Hours At least 30 credit hours	Technical Electives: at least 24 credit hours	CSE Courses 500 level or above at least 15 credit hours	427 and 627 (BOTH) VLSI Kernel Requirements (Two of 400 level: 482; 483; 484; 485; 487; 489; 490 or 571 or 582 or 583 or 584 or 587 or 588 or 589 or 590 or 591 (Software)	543 or 545 or 592 (Artificial Intelligence)	470 or 473 or 478 or 527 or 570 or 573 or 577 or 578 or 579 or 583 (Hardware)	574 or 575 or 586 (Theory)
<b>Total Hours:</b> (fill in for each column)									

- NOTES:**
- 1) A maximum of six credit hours of individual study, research, and seminars
  - 2) You must meet all Rackham and Program requirements (see brochures for details)
  - 3) It is expected that most entering students will have already completed courses equivalent to (482 or 483) and 492 and (470 or 478)
  - 4) Seminar, directed study credits (except 3 hrs. of EECS 599) do not count toward the 500 level course requirement
  - 5) It is the student's responsibility to see that all requirements are met.
  - 6) You must choose 2 of the 4 areas in addition to the VLSI Kernel
  - 7) one of the 500 level must be from the approved list/see brochu
  - 8) If you already have a masters degree from another institution that has been deemed relevant by CSE you are not eligible for a masters degree from this program.

for office use only:									
	No grades below B-								Term: _____
	Approved MPS								
	Other, Masters thesis, TC								
MSE	MS							GPA	CTP



# CSE Candidacy Checklist for the Ph.D. Program

Advisor (signature required) \_\_\_\_\_

Stu Name: \_\_\_\_\_ UMID: \_\_\_\_\_

Date \_\_\_\_\_

email: \_\_\_\_\_

			<i>Depth</i>		<i>Breadth</i>					
			Directed study (3 hrs of 699)	Cognates: At least 4 hrs. of Grad. Level course work	Course	* Course	Software	Artificial Intelligence	Hardware	Theory
Course	Grade	Credit Hrs.								

**Depth Coursework:**  
2 courses from list, A- or better, one must be a \* Course, no equiv

**Breadth Coursework:**  
1 course each from 3 of the 4 areas, B+ or better, equiv possible

Approved List is attached

Cognates are courses outside the CSE Division (Courses cross-listed with CSE may not be used, and all cognates must be approved by advisor)

You must meet all Rackham and Program requirements (see brochures for details)

It is the student's responsibility to see that all requirements are met.

Term you plan to become a candidate: \_\_\_\_\_

Have you completed RCRS training? \_\_\_\_\_  
If yes, please attach a copy of the confirmation. If no, you are not eligible for candidacy)

Has your bachelors degree and masters (if applicable) been posted to your transcript? \_\_\_\_\_  
If no, you are not eligible for candidacy)

Oral Preliminary Exam Date: \_\_\_\_\_

Qualification Date: \_\_\_\_\_

Were you registered when you took the prelim? \_\_\_\_\_

Faculty you will register with for research in your first candidacy term: \_\_\_\_\_

\*\*\* You are responsible for meeting all department and Rackham requirements for candidacy. This form should be filled out after you have been qualified by the CSE Faculty to continue on for the Ph.D. Program. You must complete all requirements for candidacy the term before you can be advanced (including the submission of this form).

**CSE Ph.D. STUDENT  
MASTERS PLAN OF STUDY**

\_\_\_\_\_  
Advisor (signature required)

Stu Name: \_\_\_\_\_

UMID: \_\_\_\_\_

Date \_\_\_\_\_

MSE Degree      or      MS Degree    (circle one)

Degree Term: \_\_\_\_\_

(What is your undergrad degree field? (engineering or non-engineering) \_\_\_\_\_)

*Depth                  Breadth*

			Directed study (3 hrs of 699)	Cognates: At least 4 hrs. of Grad. Level course work	Course	* Course	Software	Intelligent Systems	Hardware	Theory
Course	Grade	Credit Hrs.								
<b>Total Hours:</b> (fill in for each column)										

**NOTES:** \_\_\_\_\_

**Depth Coursework:**  
2 courses from list, A- or better, one must be \* Course, no equiv

**Breadth Coursework:**  
1 course each from 3 of the 4 areas, B+ or better, equiv possible

Cognates are courses outside the CSE Division (Courses cross-listed with CSE may not be used, and all cognates must be approved by advisor)

You must meet all Rackham and Program requirements (see brochures for details)

It is expected that most entering students will have already completed courses equivalent to (482 or 483) and 492 and (470 or 478)

It is the student's responsibility to see that all requirements are met.

If you already have a masters degree from another institution that has been deemed relevant by CSE you are not eligible for a masters degree from this program.

(=> 30) (=>3) (=>4)

for office use only:

_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	
No grades below B-											
Approved MPS											
Other, Masters thesis, TC											
Term _____											
MSE    MS									GPA _____		CTP _____

# Computer Science and Engineering Graduate Program Dissertation Committee Request Form

To: Professor John Hayes, Graduate Program Chair

From:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Mailing address

\_\_\_\_\_  
City/State/Zip

\_\_\_\_\_  
Student ID#

\_\_\_\_\_  
email address

Subject: Dissertation Committee Approval

Please consider the following professionals for my Dissertation Committee.

Chair/Co-Chairs

\_\_\_\_\_  
Name and UM email address

\_\_\_\_\_  
Title

\_\_\_\_\_  
Department

\_\_\_\_\_  
Name and UM email address

\_\_\_\_\_  
Title

\_\_\_\_\_  
Department

Cognate member

\_\_\_\_\_  
Name and UM email address

\_\_\_\_\_  
Title

\_\_\_\_\_  
Department

Other member(s)

\_\_\_\_\_  
Name and UM email address

\_\_\_\_\_  
Title

\_\_\_\_\_  
Department

\_\_\_\_\_  
Name and UM email address

\_\_\_\_\_  
Title

\_\_\_\_\_  
Department

\_\_\_\_\_  
Name and UM email address

\_\_\_\_\_  
Title

\_\_\_\_\_  
Department

If a committee member is not a tenure-track Rackham faculty member, please attach their C.V. and a paragraph/statement regarding their qualification for serving on your committee.

Approval of Chair/Co-Chairs \_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_ Date: \_\_\_\_\_

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For department use only. Circle one:

Dissertation Committee is/ is not approved.

CSE Grad Prog Chair : \_\_\_\_\_ Date: \_\_\_\_\_

## **Computer Science and Engineering Graduate Program Dissertation Committee Request Form Page 2**

### **CSE Guidelines for the CSE Dissertation Committee**

A typical CSE Dissertation Committee consists of three regular CSE Faculty and one cognate Rackham Faculty member representing a non-CSE discipline. The committee's composition must be approved by the CSE Graduate Program Committee.

In addition to complying with all the Rackham requirements the CSE Graduate Program requires that: one member of the committee must be a tenure-track CSE faculty with at least 50% appointment in CSE, and a second member must have a CSE appointment exceeding 50%. A faculty member with a 50% or higher CSE appointment may not serve as the Cognate member of the committee.

A CSE faculty member with a 0% appointment can serve as sole chair of a committee. A CSE faculty member with a 0% appointment can be a cognate member of a committee, however one person cannot be both a cognate and regular (non-cognate) member of the same committee. The Dissertation Committee is responsible for reviewing the student's progress, including the thesis proposal and the final dissertation. The dissertation committee must be approved prior to the thesis proposal date.

**Computer Science and Engineering Graduate Program  
PETITION REQUEST**

**PETITION TO THE CSE GRADUATE COMMITTEE**

Request for extension of deadline for completion of milestones (e.g. Qualifying examinations, thesis proposal, etc.) or other special requests.

Directions: The student should provide an explanation of why the deadline cannot be met as scheduled; what work remains; and by what date (month/year) it can be completed. The academic advisor and/or research advisor must endorse the request before forwarding it to the Graduate Committee. Return this completed form to the CSE Graduate Office, 3909A BBB.

Type or print your name and your mailing address:

Name \_\_\_\_\_ UMID# \_\_\_\_\_

UM e-mail \_\_\_\_\_

Degree level \_\_\_\_\_ Term Admitted to Program \_\_\_\_\_

Brief description of your petition request:

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**OR TYPE YOUR REQUEST ON A SEPARATE SHEET AND ATTACH TO THIS FORM.  
(student and advisor must also sign the attached request)**

Signature of Student \_\_\_\_\_ Date \_\_\_\_\_

\*\*\*\*\*

I (do) (do not) support this petition.

Academic Advisor Name (print and signature): \_\_\_\_\_

I (do) (do not) support this petition.

Research Advisor Name (print and signature) (if applicable): \_\_\_\_\_

\*\*\*\*\*

I (do) (do not) support this petition.

Graduate Committee Decision: \_\_\_\_\_

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Graduate Chair: \_\_\_\_\_ Date \_\_\_\_\_

COMPUTER SCIENCE AND ENGINEERING  
REQUEST FOR COURSE EQUIVALENCY FOR BREADTH REQUIREMENTS

Instructions to the student: Please complete and sign this form and take it to the UM Faculty member responsible for the UM course in question. Obtain your advisor's signature and return the form to the CSE Graduate Coordinator in 3909A BBB.

Equivalency can be accepted for breadth coursework requirements only.  
(Do not use this form for cognate course requirements.)

1. Student Name: \_\_\_\_\_ ID: \_\_\_\_\_

2. UM Course for which equivalency is requested (Number and title):

\_\_\_\_\_

3. Course taken elsewhere to be considered for equivalency:

University that the course was taken at: \_\_\_\_\_

Course Number and title: \_\_\_\_\_

Credit Hours: \_\_\_\_\_

Grade earned: \_\_\_\_\_

STUDENT SIGNATURE: \_\_\_\_\_ Date \_\_\_\_\_

4. UM Faculty Member teaching equivalent course: \_\_\_\_\_

url for past teaching assignments for EECS courses: <http://www.eecs.umich.edu/eecs/undergraduate/pastteaching.pdf>

\*\*\*\*\*

This section to be filled out by the faculty member reviewing materials:

5. Course information reviewed by UM faculty member:

\_\_\_\_\_ 1) Course outline

\_\_\_\_\_ 2) Course catalog description

\_\_\_\_\_ 3) Course notes, assignments, tests

\_\_\_\_\_ 4) Course pack

\_\_\_\_\_ 5) Transcript copy

\_\_\_\_\_ Other \_\_\_\_\_

This course is equivalent for purposes of Masters requirements \_\_\_\_\_

This course is equivalent for purposes of Ph.D. breadth requirements

(please make sure grade is equal to B+ or better) \_\_\_\_\_

SIGNATURE OF FACULTY MEMBER: \_\_\_\_\_ Date: \_\_\_\_\_

SIGNATURE OF ACADEMIC ADVISOR: \_\_\_\_\_ Date: \_\_\_\_\_

\*\*\*\*\*

\*\*Return form to CSE Graduate Coordinator in 3909A BBB

APPROVAL OF CSE GRADUATE CHAIR: \_\_\_\_\_

Date: \_\_\_\_\_

CSE  
NOTIFICATION OF ADVISOR CHANGE

STUDENT NAME \_\_\_\_\_ ID \_\_\_\_\_

UM Email \_\_\_\_\_

I am requesting a change of advisor.

My current **academic / research** advisor is \_\_\_\_\_.  
(circle appropriate choice)

My new **academic / research** advisor will be \_\_\_\_\_.  
(circle appropriate choice)

Student Signature: \_\_\_\_\_ Date \_\_\_\_\_

Previous Advisor: \_\_\_\_\_ Date \_\_\_\_\_

New Advisor: \_\_\_\_\_ Date \_\_\_\_\_

Ph.D. Degree Requirements:				EECS Courses and CSE Degree Requirements List							Terminal Master's Requirements:					
Depth	Depth starred	Breadth		Credits	Term Offered	Approved for Cognate by CSE (for PhD Students Only)	CSE Course Graduate Level	Not CSE Grad level cannot be used in any capacity toward a CSE Grad Degree	CSE 500 Level	Technical Elective	Hardware	Software	Artificial Intelligence	Theory	VLSI	
		Hardware	Software													Artificial Intelligence
				EECS Courses												
				402 Computer Programming for Scientists & Engineers (Non-EECS)	4			402								
				406 / ENGR 406 High-Tech Entrepreneurship	4		406									
				410 / ENGR 410 Patent Fundamentals for Engineers	4		410									
				411 Microwave Circuits I	4		411			x						
				413 Monolithic Amplifier Circuits	4		413			x						
				414 Introduction to MEMS	4		414			x						
				417 / BIOMEDE 417 Electrical Biophysics	4		417			x						
				418 Power Electronics	4		418			x						
				419 Electric Machinery and Drives	4		419			x						
				421 Properties of Transistors	4		421			x						
				423 Solid-State Device Laboratory	4		423									
				425 Integrated Microsystems Laboratory	4		425									
		H427		427 VLSI Design I	4	F, W	427			x	H427				V 427	
				429 Semiconductor Optoelectronic Devices	4		429			x						
				430 / CLIMATE 431 / SPACE 431 Radiowave Propagation & Link Design	4		430			x						
				434 Principles of Photonics	4		434			x						
				435 Fourier Optics	3		435			x						
				438 Advanced Lasers Laboratory	4		438									
				441 Mobile App Development for Entrepreneurs	4			441								
				442 Computer Vision	4	F, W	442			x						
				443 Senior Thesis	3			443								
				444 Analysis of Societal Networks	4			444								
				445 Introduction to Machine Learning	4			445								
				452 Digital Signal Processing Design Laboratory	4		452									
				453 Applied Matrix Algorithms for Sig Proc, Data Analysis, & Mach	4	varies	453									
				455 Wireless Communications Systems	4		455			x						
				458 / BIOMEDE 458 Biomedical Instrumentation & Design	4		458			x						
				460 Control Systems Analysis and Design	4		460			x						
				461 Embedded Control Systems	4		461			x						
				463 Power Systems Design and Operations	4		463			x						
				464 Hands-on Robotics	4			464								
				467 Autonomous Robotics	4			467								
D470		H470		470 Computer Architecture	4	F, W	470			x	H470					
		H473		473 Advanced Embedded Systems	4	F	473			x	H473					
				475 Introduction to Cryptography (alternating terms)	4	F, W	475			x						
				477 Introduction to Algorithms	4	F	477			x						
		H478		478 Logic Circuit Synthesis and Optimization	4	F, W	478			x	H478					
				480 Social Computing Systems	4			480								
				481 Software Engineering	4	F, W	481			x						
			1/2 S482	482 Introduction to Operating Systems	4	F, W	482			x		1/2 S 482				
			1/2 S483	483 Compiler Construction	4	W	483			x		1/2 S 483				
			1/2 S484	484 Database Management Systems	4	F, W	484			x		1/2 S 484				
			1/2 S485	485 Web Systems	4	F, W	485			x		1/2 S 485				
				486 Information Retrieval and Web Search	4	W	486			x						
			1/2 S487	487 Interactive Computer Graphics	4	F	487			x		1/2 S 487				
			1/2 S489	489 Computer Networks	4	W	489			x		1/2 S 489				
			1/2 S490	490 Programming Languages	4	F	490			x		1/2 S 490				
				491 Introduction to Distributed Systems				491								
				492 Introduction to Artificial Intelligence	4			492								
				493 User Interface Development	4	F, W	493			x						
				494 Computer Game Design and Development	4			494								
				496 Major Design Experience Professionalism	2			496								
				497 EECS Major Design Projects	4			497								
				498 Special Topics	1 - 4			498								
				499 Directed Study	1 - 4			499								
				500 Tutorial Lecture Series in System Science	1		500									
				501 Probability and Random Processes	4		501			x						
				502 Stochastic Processes	3		502			x						
				503 Introduction to Numerical Electromagnetics	3		503			x						
D504				504 Foundations of Computer Vision	3		504		504	x						
				505 Comp DS & ML	4		505			x						
				509 BioMEMS	3		509			x						
				510 RF MEMS	4		510			x						
				511 Integrated Analog/Digital Interface Circuits	4		511			x						
				512 Amorphous and Microcrystalline Semiconductor Thin Film Devices	3		512			x						
				513 Flat Panel Displays	3		513			x						
				514 Advanced MEMS Devices and Technologies	4		514			x						
				515 Integrated Microsystems	4		515			x						
				516 / BIOMEDE 516 Medical Imaging Systems	3		516			x						
				517 / NERS 578 Physical Processes in Plasmas	3		517			x						
				518 / SPACE 595 Magnetosphere and Solar Wind	3		518			x						
				519 / NERS 575 Plasma Generation and Diagnostics Laboratory	4		519			x						
				520 Solid State Physics	4		520			x						
				521 Solid State Devices	3		521			x						
D522				522 Analog Integrated Circuits	4	W	522		522	x					V 522	
D523				523 Digital Integrated Technology	4	F	523		523	x					V 523	
				525 Advanced Solid State Microwave Circuits	3		525			x						
				526 Plasmonics	3		526									
D527	D*527	H527		527 Layout Synthesis and Optimization (every 3rd term)	3 - 4	F, W	527		527	x	H 527				V 527	
				528 Principles of Microelectronics Process Technology	3		528			x						





Ph.D. Degree Requirements:					EECS Courses and CSE Degree Requirements List								Terminal Master's Requirements:							
Depth	Depth starred	Breadth			Credits	Term Offered	Approved for Cognate by CSE (for PhD Students Only)	CSE Course Graduate Level	Not CSE Grad level cannot be used in any capacity toward a CSE Grad Degree	CSE 500 Level	Technical Elective	Hardware	Software	Artificial Intelligence	Theory	VLSI				
		Hardware	Software	Artificial Intelligence													Theory			
					EECS Courses															
					682 Special Topics in Software Systems	3		682												
					684 Current Topics in Databases	3	varies	684												
					691 Mobile Computing	3		691		691	x									
D692	D*692				692 Advanced Artificial Intelligence	4	W	692		692	x									
					698 Master's Thesis	1 - 6		698												
					699 Research Work in Electrical Engineering and Computer Science	1 - 6	F, W	699												
					700 Special Topics in System Theory			700												
					720 Special Topics in Solid-State Devices, Integrated Circuits, & Physical	1 - 4		720												
					730 Special Topics in Electromagnetics	1 - 4		730												
					735 Special Topics in the Optical Sciences	1 - 4		735												
					750 Special Topics in Communication and Information Theory			750												
					755 Special Topics in Signal Processing	1 - 4		755												
					760 Special Topics in Control Theory			760												
					765 Special Topics in Stochastic Systems and Control	3		765												
					820 Seminar in Solid-State Electronics	1		820												
					892 Seminar in Artificial Intelligence	2		892												
					990 Dissertation/Pre-Candidate (PhD credit only)	1 - 8	F, W													
					995 Dissertation/Candidate (PhD credit only)	8	F, W													
					Revised September 2019															