PhD Graduate Program Guide

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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Last Modifier: March 2015

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Purpose of This Guide

This document has been prepared to answer common questions about the PhD programs offered by the UTA Computer Science and Engineering Department. It supplements the *UTA Graduate Catalog* with specific information for the program. Nothing herein is intended to conflict with information in the Catalog. Italicized items have their own definition elsewhere in this document.

All students are expected to be familiar with appropriate sections of this Graduate Program Guide and the information herein before seeking advice from the *Graduate Advisor*. All PhD students must check their e-mail on the Cse account frequently as any communication on PhD related matters will be conveyed by this e-mail.

The University, College and Department

The University of Texas at Arlington is a 110-year-old, comprehensive research, teaching and public service institution located in the heart of the dynamic Dallas-Fort Worth Metroplex. It is the second largest component of the world-renowned University of Texas System and the sixth largest university in Texas.

The University of Texas at Arlington is located in the heart of the Dallas/Fort Worth Metroplex, one of the fastest growing areas in the nation. UTA has emerged as a comprehensive teaching, research and public service university. UTA offers 84 baccalaureate, 69 masters and 30 doctoral degrees within nine academic units and a graduate school. A modern 390-acre campus a few blocks from downtown Arlington offers easy access to museums, concerts, ballet, theater, family recreation, professional sports and other interests.

With an enrollment of approximately 25,000 students, UTA is the second largest of the 15 institutions in The University of Texas System. The student body has become increasingly diversified with students representing 47 states and 150 countries.

The University's academic units include the School of Architecture, College of Business Administration, College of Engineering, College of Liberal Arts, School of Nursing, College of Science, School of Social Work, School of Urban and Public Affairs, and the Center for Professional Teacher Education. Additionally, the Graduate School oversees the administration of academic programs beyond the baccalaureate level.

In response to societal needs, UTA has evolved into a university of renown within the state and of emerging position nationally and internationally. The University's history of achievement can be attributed to a faculty of increasing competence and accomplishments; a student body of higher qualifications and greater diversity; a record of growing success by graduates in their respective

disciplines; and the maturation of the Dallas/Fort Worth area as a nationally and internationally significant metropolis.

University was elevated to senior college status in 1959 and was transferred from the Texas A&M System to The University of Texas System in 1965. Its final name change came in 1967, when it became The University of Texas at Arlington. The College of Engineering with 4000 students is the third largest in Texas. The college presently has approximately 120 faculty and is aggressively recruiting in several key areas. The goals of the College are to provide quality engineering education at both graduate and undergraduate levels and to provide a research and educational resource to technology-based enterprises in North Texas. The research community accesses computing resources locally and elsewhere as appropriate. The College seeks to disseminate engineering expertise in the North Texas area to students at the graduate level in local industry and other academic institutions through the TAGER Network, by sponsoring seminars on campus (e.g., UTA Teleconferences), and by individual contacts on a formal or informal basis.

UTA is emerging as a major national research institution. An important strategy in this emergence is the channeling of resources, intramural and external, into carefully chosen problem areas in which initial capability already exists, which relate to regional interests, and which show promise for significant contribution to national concerns. For example, the first in a series of premier research programs in The University of Texas System is UTA's Automation and Robotics Research Institute (ARRI) aimed at enhancing high technology in Texas and the U.S.

Historically, the computer science program at UTA started in the early 1970's as a master's level program within Industrial Engineering. A Ph.D. program was started a few years later. The bachelor's degree was first offered in 1978. A separate Computer Science and Engineering Department was established in 1980. Since the program's inception, there has been a steady growth in enrollment and quality. The undergraduate program was the first in the state to be accredited by the Accreditation Board for Engineering and Technology (ABET) and also carries Computing Sciences Accreditation Board (CSAB) accreditation. Current undergraduate enrollment exceeds sevenhundred (700). The graduate programs currently enroll three hundred eighty (380) at the master's level and ninety (90) at the doctoral level. Graduates are readily recruited by industry and can be found in exciting computer-related positions throughout the area and the nation.

Doctoral Program

Typical Accepted Student

We prefer PhD students who have:

1. A master's degree in computer science or a related field, *preferably with thesis* as evidence of

research aptitude.

2. A 3.2 grade point average (on a 4.0 scale) in all previous work, preferably with advanced course work.
3. A sum of verbal and quantitative scores of 310 or more on the GRE and a 160 on the GRE quantitative score. Also, the GRE computer science subject exam is encouraged.
4. Students whose primary language is not English must satisfy the UTA English proficiency requirement (TOEFL/SPEAK test) to qualify for an assistantship.
5. Strong recommendations (at least three), preferably from university faculty in technical areas.
6. A solid statement of goals indicating an area of doctoral-level research, which can be supported by the department. The statement must have specific research area(s) that the student seeks to pursue and PhD in, and not a broad and general statement of interest encompassing all areas of CSE.
7. An international student whose native language is not English is required to take the Test of English as a Foreign Language (TOEFL, http://www.toefl.org/). If the score is less than 92 (IBT max=120), the applicant may be required to take additional English courses after admittance to the Graduate School.

Entrance Requirements and Procedures

See the Entrance Requirements section of the *Graduate Program Guide (MS)* for application procedures and evaluation criteria. When all materials have been collected in the Graduate School office, the complete package is forwarded to the Computer Science and Engineering *Graduate Advisor* for evaluation. Applicants are required to submit a statement outlining their goals and objectives for graduate study along with their application. This will be used by the *Graduate Studies Committee* to ascertain whether available faculty expertise and interest can properly support the student's dissertation research.

Applicants currently in the master's program at UTA should file a Request to Continue beyond the Master's Degree, along with a new statement of purpose and three letters of recommendation from faculty members. UTA students seeking continuation into the PhD program will be subjected to the same criteria as applied in evaluating new applicants. Please note that among other things, the admission committee places significant emphasis on the thesis work pursued in your Masters program.

Degree Requirements

This section contains the requirements for earning the degree of Doctor of Philosophy in Computer Science or Computer Science and Engineering from the Department of Computer Science and Engineering at UTA. It is the intent of CSE to incorporate all Graduate School requirements into this document. However, students are still responsible for meeting all current Graduate School requirements as stated in the catalog.

Introduction

Students receiving a Ph.D. in CS or CpE(Computer Engineering) are expected to achieve and demonstrate a mastery of the discipline, and significantly advance the state of knowledge through an original research effort. Coursework for an M.S.C.S. degree tends to be the primary focus while the thesis is secondary. The emphasis is reversed in Ph.D. studies.

The graduation requirements fall into three categories: completion of a specified number of graduate credits in appropriate subjects with an acceptable grade-point average, demonstration of understanding of the discipline of computer science as evidenced by examination, and completion of a substantial research effort documented in a doctoral dissertation.

The Ph.D. Timeline gives a detailed roadmap with expected time limits that have to be met on the various milestones. The Ph.D. checklist shows major milestones for completing the degree requirements for students with and without Master's degrees in Computer Science. The *Graduate Studies Committee* prefers applicants with Master's degrees, but does not require it for admission. The milestones that a student passes during the course of a doctoral program are: *diagnostic evaluation*, basic and advanced course work, *comprehensive examination*, research proposal, dissertation research and documentation, and *dissertation defense*. At least two consecutive semesters of residence are required and the final GPA must not be less that 3.5 on a 4.0 scale. There is no foreign language requirement.

Initial Advising

Upon entry into the program, students should see the *Graduate Advisor* to decide on initial coursework and discuss their anticipated timeline.

Credit Requirements For MS to PhD candidates

All students entering the program are expected to possess knowledge equivalent to the CSE and Math *foundation courses* as specified in the Master's brochure.

A student must enroll for a *minimum* of 18 semester hours of Coursework beyond the Masters degree. Courses involving a letter grade constitute coursework. Eighteen hours being the minimum a typical student would take around 24 hrs to meet the necessary breadth and depth that the supervising committee assigns. Foundation courses (undergraduate deficiency courses) are not part of the 18 credits.

There is no formal procedure for transferring course work taken at another university for credit in a doctoral program

A student must also enroll for a minimum of 18 semester hours of dissertation research (CSE 6399, 6699, 6999) with 6999 required in the semester in which the dissertation is defended.

Credit Requirements For BS to PhD candidates

All students entering the program are expected to possess knowledge equivalent to the CSE and Math *foundation courses* as specified in the Master's brochure.

A BS to PhD student must enroll for a *minimum* of 30 semester hours of Coursework as follows:

(12 hours) 4 core courses

- CSE 5311 - Design and Analysis of Algorithms

and 3 of the following

- CSE 5301 - Data Analysis and Modeling Techniques
- CSE 5306 - Design of Operating Systems
- CSE 5317 - Design and Construction of Compilers
- CSE 5350 - Computer Systems Architecture

There is no formal procedure for transferring course work taken at another university for credit in a doctoral program

A student must also enroll for a minimum of 18 semester hours of dissertation research (CSE 6399, 6699, 6999) with 6999 required in the semester in which the dissertation is defended.

Grades

No graduate credit is earned for a course in which a grade of less than "C" is earned. All courses do count toward the total GPA.

If at any point a student's GPA drops below 3.0, the student is placed on academic probation. The student then has one semester to raise his/her GPA back up to 3.0 or be dismissed from the program

Residence

The objective of the Ph.D. program is to develop Ph.D. candidates who can do independent research upon graduation. This objective is not compatible with part-time study. Therefore, at least two consecutive semesters of full time residence is required during the dissertation phase. Full time study may be pursued in conjunction with some teaching duties or departmentally supported research but is not compatible with off-campus employment

The *Graduate Studies Committee* may levee additional residence requirements or set specific progress goals to be attained during residency.

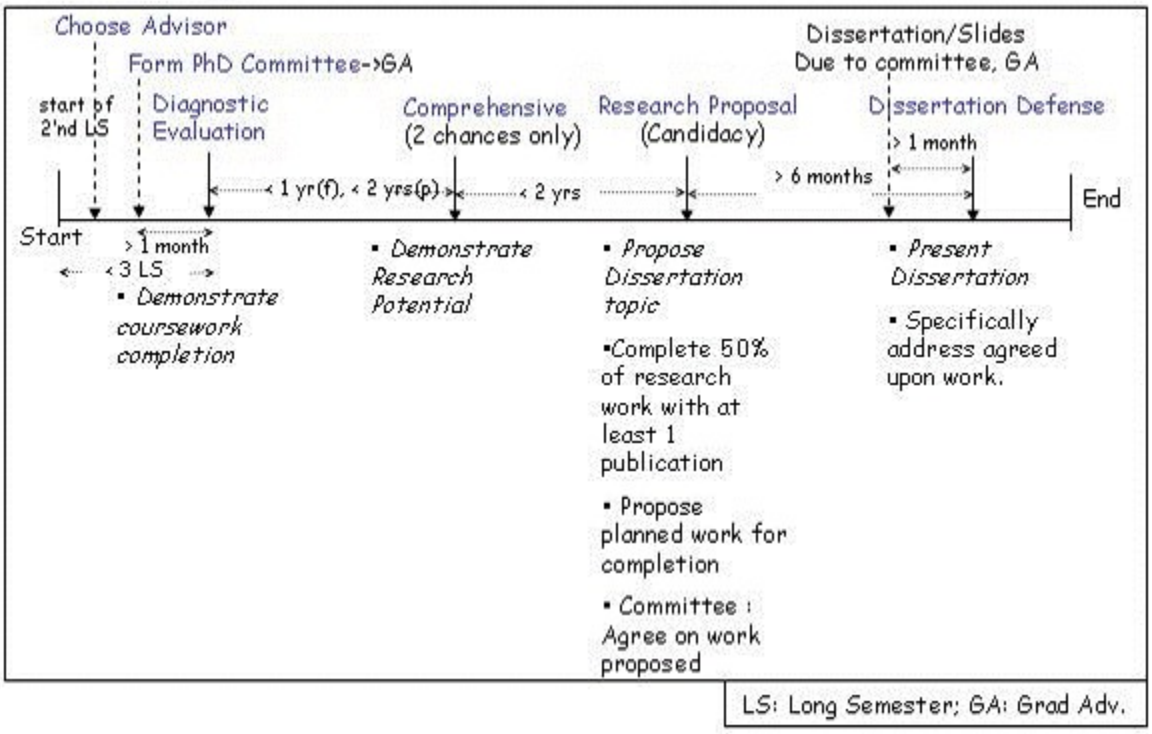
Status Reports

All PhD students are required to submit an annual progress report describing the work they did that

year and the milestones they have completed and plan to complete. The form for this is at the end of this document.

PhD TimeLine

A



PhD student is required to decide on a Supervising Professor by the start of their second long semester in the PhD program. This must be conveyed to the Graduate Advisor in writing accompanied by the Supervisor's approval.

- The student must form his/her PhD committee at least one month prior to the Diagnostic Evaluation. A form showing the consent of the members to serve on the student's PhD committee must be submitted to the Graduate Advisor.
- The Diagnostic Evaluation itself must be completed *no later than* three long semesters after the student's start in the PhD program. (Form will be prepared by the Grad Secretary)
- The Comprehensive Exam must be scheduled *no later than* one year for full-time students and two years for part-time, after the Diagnostic Evaluation. (Form will be prepared by the Grad Secretary along with filing an application for Candidacy and the Final program of work)
- The candidate must present his/her Research proposal to the PhD Committee no later than two years after the Comprehensive exam. (Form will be prepared by the Grad Secretary)
- The candidate is expected to submit a copy of the PhD dissertation document along with the

slides to the PhD committee, at least one month prior to the actual defense. Also, copies of papers and associated reviews must be submitted to the committee at this time.

- The Final dissertation defense must be scheduled *no earlier than* 6 months after the Research Proposal. (Graduation and related forms will be prepared by the Grad Secretary)

The specifics of the Diagnostic Evaluation, Comprehensive Exam the Research Proposal and the Dissertation document and defense follow.

Supervising Professor and Committee

The student must find a Supervising Professor and form an *advisory committee*, called the *Supervising Committee*. It is the responsibility of the student to find a faculty member willing to provide a research topic or to supervise a topic of the student's choosing.

The *Supervisory Committee* consists of the Supervising professor (serving as the chair of the committee), and at least three others. The Supervising professor must be a member of the graduate faculty. Of the remaining members, three must be members of the graduate faculty or associate members of the graduate faculty. A majority of the committee (including the supervising professor) must be from the CSE faculty.

The *Supervisory Committee* is responsible for administering the diagnostic evaluation and the comprehensive exam, over-seeing the dissertation research, and conducting the dissertation defense.

Diagnostic Evaluation

At the beginning of a Ph.D. program, the student should make plans to take the Diagnostic Evaluation. To pass the Diagnostic Evaluation, students are required to take and pass **four** core courses, **3** breadth courses (please note that most students with a CSE background may have already passed a majority of these classes and therefore will not be required to retake them). The four core courses are listed below:

- CSE 5311 - Design and Analysis of Algorithms

and 3 of the following:

- CSE 5301 - Data Analysis and Modeling Techniques
- CSE 5306 - Design of Operating Systems
- CSE 5317 - Design and Construction of Compilers
- CSE 5350 - Computer Systems Architecture

The student has a choice of **3** out of a possible **9** breadth (currently) areas. The breadth areas reflect the main areas of emphasis of the CSE department and may change to include new areas in the future. At the current time the student has a choice of the following breadth courses:

- Artificial Intelligence
- Database Systems
- Graphics and Image Processing
- Multimedia Systems
- Networks, Systems and Architecture
- Software Engineering
- Theory and Algorithms
- Bioinformatics
- Information security

The three breadth classes must be in different areas, that is, you cannot count more than one course in a specific area. Also, one cannot count a core course as one of the required breadth courses.

For each of the courses, a student may do one of the following (see Diagnostic Evaluation Worksheet):

1. Take the appropriate course at UTA.
   or
2. Take the course elsewhere and list the grade obtained

In both cases, the course grade is counted in the diagnostic GPA.

Note that the courses taken by the student beyond Masters to fulfill the requirements of the diagnostic evaluation are counted as PhD credits.

To pass the diagnostic evaluation, the student must achieve a Grade Point Average of 3.5 or higher in the courses considered, where A=4 points, B=3 points, and C=0 points. The Committee meeting to make the Diagnostic Evaluation may recommend that the student take additional courses on topics (areas) that they deem beneficial in improving the student's research skills in general and his/her interests in particular. Such recommendations may primarily involve advanced (6000+) level classes.

Comprehensive Exam

The comprehensive exam is intended to test the student's ability to comprehend quality research through critical analysis and being able to present such analysis to an audience (in this case the committee). The exam has two components: A written part and an oral part.

The committee administering the comprehensive exam assigns the student the work related to the comprehensive exam at the request of the Supervising Professor. The student is expected to make a presentation to the members of the committee to give a very brief overview of the area(s) that his/her research would encompass. Each member of committee assigns the following *work:* Technical papers (at least one, no more than two) for the student to read, and answer questions on. The total number of questions (from all committee members) will be no fewer than five and no more than ten. The student

will be given approximately 2 weeks (specified by the committee) to provide responses to the questions in written form. This constitutes the *written part* of the exam. The written answers will be filed in the student's records. The committee must meet for an oral presentation by the student, at which time the committee tests the student's understanding of the technical content of the assigned papers. This constitutes the *oral part* of the exam.

Following the completion of the written and oral parts, each committee member will assign a letter grade similar to a course grade based on their assessment of the student's answers to their questions and the oral presentation. The committee then assigns a cumulative grade for the student's performance on the exam. A passing grade is a 3.5 or better GPA. A GPA of less than 3.5 is grounds for either allowing the student to *repeat* the exam or to *fail* (resulting in termination of PhD studies) the student as determined by the committee. A student will be given at most two chances to pass the exam.

Admission to Candidacy

Upon passing the comprehensive examination the student becomes eligible for admission to candidacy. The Application for Candidacy form must be filed in the Graduate School and approved by the Graduate Dean at least one semester prior to the awarding of the degree. Once this approval is received the student is deemed a PhD candidate.

Research Proposal

The research proposal serves two purposes, it shows to the committee the work that the candidate has already completed on the topic of planned dissertation and secondly, the work that the candidate plans to pursue towards completion of the dissertation. It is the committee's discretion to require the student to make an oral presentation; however a research proposal document must be submitted to the committee and filed with the CSE department.

Dissertation

The most clearly distinguishing characteristic of a program leading to the Ph.D. degree is the requirement that the candidate write a dissertation embodying the results of significant and original investigation. The dissertation must make a real contribution to the engineering or the applied science discipline, and it is expected to be a mature and competent piece of writing. The work that it reports may be basic scientific research, engineering research, or creative design.

All doctoral dissertations must be in the format prescribed by the Graduate Dean. Each student is also expected to submit papers for publication in a reputable scientific journal appropriate to the field of research. The final copies of the doctoral dissertation must be prepared according to the regulations described in the current edition of "An Illustrated Guide to the Preparation of Theses and Dissertations" available from the UTA Bookstore, in the reference section of the Library, and discussed in The Graduate School's seminar on thesis / dissertation preparation. The catalog section on Tuition and Fees

lists dissertation binding, microfilming, and copyrighting fees.

The Assistant Dean of the Graduate School examines each dissertation and determines whether or not the dissertation meets Graduate School requirements for format and mechanical presentation. Details of the dissertation submission process are available from the Graduate School Office. The original and five copies of the dissertation must be delivered to the Graduate School following the dissertation defense. The original title page must be signed in black ink by all members of the advisory committee.

Candidates for the Ph.D. degree pay the cost of binding five copies of the dissertation, and of microfilming the dissertation and publishing the abstract in Dissertation Abstracts, a service performed by University Microfilms, Inc. (http://www.umi.com/). At the student's option a copyright can be obtained at the same time upon payment of an additional fee. The Graduate School retains three bound copies for distribution and returns two to the student. The student must submit one copy to the major professor and one copy to the CSE department. The student may have additional copies bound for a fee.

Dissertation Defense

The student must file an application for the dissertation defense in the Graduate School no later than three weeks before the final date for submission of approved dissertations and dissertation defense reports. The dissertation examining committee must have copies of the dissertation at least four weeks prior to the dissertation defense. Exceptions to this four-week limit can be sought from individual members of the committee.

The dissertation defense will be oral and open to all members (faculty, students, and invited guests) of the university community. The questioning of the candidate will be generally directed by the student's Supervisory Committee, but any person attending the defense may participate in the examination. Although the defense is concerned primarily with the dissertation research and content, the committee may explore the student's knowledge of areas interrelated with the core of the dissertation problem.

Publication Requirements

A PhD student is required to conduct research leading to the submission of distinct, quality publications to at least one premier journal and two premier conferences.

- All papers must be related to the PhD dissertation work.
- Copies of all papers and associated reviews are due when the dissertation is submitted to the committee.
- Quality of submission will be established either by its acceptance for publication or, by the committee based on the paper's content and referee reviews/comments.

The dissertation defense report must be filed in the Graduate School no later than three weeks before

the date the degree is to be conferred.

Time Limits

Please note that the graduate catalog states that all requirements for the doctoral degree must be completed within four years after passing the comprehensive examination. Time limits other than this as presented in the timeline are amendable by the Ph.D. committee under compelling circumstances, for example for students pursuing a part-time Ph.D. The total PhD program may not exceed 99 semester hours or seven years.

Change of Committee or Coursework

A student may change coursework, major professor, or Supervisory Committee members at any point, subject to the approval of the Graduate Studies Committee. If the student elects to change course work after the "Final Program of Work" report is filed, a "Change of Program Request" must be approved and filed. If a student changes major professor or Supervisory Committee members after the original research proposal has been submitted, a new research proposal will be required.

Research Areas

The Computer Science and Engineering Department currently supports Ph.D. studies in the following areas:

1. Computer Architecture and Systems (Parallel processing, Fault tolerance, Distributed Operating Systems, and others).
2. Database Systems (Logical and physical design, Distributed databases, Object-oriented databases and others).
3. Intelligent Systems (Knowledge representation, Knowledge acquisition, Machine learning, Neural networks, Parallel AI and others).
4. Networking, Telecommunications, and Mobile Computing.
5. Software Engineering (Environments, Formal verification, Testing, and others)
6. Multimedia Systems (Authoring, Compression, Collaboration and Communication)
7. Theory and Algorithms
8. Bioinformatics
9. Information Security

General course work to support each of the above areas is available. Other areas are possible if the appropriate faculty is willing to support them. See the section on the faculty and their research.

PhD Checklist

	PhD Checklist (for student use only)
DATE	MILESTONE
	Student enters Ph.D. program (receives initial advising from Graduate Advisor)
	Student chooses a Supervising Professor
	Student selects Supervisory Committee (at least four members of the graduate faculty)
	Chair:
	Commitee Members:
	Diagnostic Evaluation
	Student finishes coursework (including any suggested classes as a result of the diagnostic evaluation)
	Student files request for comprehensive examination (at least 2 weeks prior to the exam date)
	Supervisory Committee conducts Comprehensive Examination and reports results to the Graduate School. (expect to take at least 2 weeks)
	Student files "Application for Candidacy and Final Program of Work" with Graduate School (at least one semester prior to planned graduation)
	Student presents “Research Proposal” to the PhD Committee (must submit the research proposal document to the department)
	Student files "Application for Graduation" and pays diploma fee (must be done before 30 days after the beginning of the semester in which graduation is desired)
	Student files request for Dissertation Defense (at least 3 weeks prior to exam date)
	Submit a copy of the dissertation (at least one month before the defense)
	Supervisory committee conducts oral dissertation defense by the candidate and reports results to the Graduate School
	Student submits signed dissertation to the Graduate School

Annual Doctoral Student Status Report

Computer Science and Engineering, University of Texas at Arlington

Due: In the CSE office by October 31st each year

Student's Name:
Report Period:
PhD Start Semester:
Expected Graduation Date:
PhD Advisor:

Work	Completed	Scheduled	In Progress
Form Committee			
Diagnostic Evaluation			
Comprehensive Exam			
Research Proposal (Candidacy)			
Research Status			
Thesis Defense			
Chapter Review and Revision			

Research Topic (5 keywords):
Title of Dissertation:
Work Completed in the past 12 months [1]:
Work to be completed during the next 12 months [2]:

Signatures:	
Student:	**Date:**
Thesis Supervisor:	**Date:**
Graduate Advisor:	**Date:**

Please return to the Graduate advisor for approval, and to be filed with your records

[1] You may attach a report of the work you have done listing any publications and citations of your work.

[2] You may attach an additional sheet detailing papers you plan to submit to specific conferences/journal.

Application for the Formation of PhD Committee

Name: _____ Date: _____

Last **First** **MI**

Address: _____

Email: _____

Research Areas [1] _____

APPROVALS [2]

Candidate's Signature : _____ Date : _____

Supervising Committee	Signature	Typed Name	Date
Supervising Professor [3]			
Member:			
Member:			
Member:			
Member:			
Member:			

	Signature	Typed Name	Date
Committee on Graduate Studies:			

Graduate Advisor: _____

Chairman: _____

[1] List at least five topics/subjects in Computer Science or other Field that are relevant to your research interests

[2] By signing this form a committee member agrees to serve on the PhD student's Dissertation Committee. The student is expected to discuss his/her interests and committee member responsibilities with the member when seeking approval.

[3] If you have a co-supervisor then underline his/her name.

CSE PhD Diagnostic Evaluation Worksheet

Name: _____
Last **First** **MI**

Student ID: _____

Date of Exam: _____

Course Evaluation [1]

Course	When/Where Taken	Grade (or Score)
Algorithms (CSE 5311)		
Data Analysis (CSE 5301)		
Operating Systems (CSE 5306)		
Compiler Design (CSE 5317)		
Computer Architecture (CSE 5350)		

Breadth 1: _____

Breadth 2: _____

Breadth 3: _____

Final Grade

1 : Refer to the Graduate Guide for description about Breadth classes in the Diagnostic Evaluation section

Course Recommendations:

Course	Semester