Ph.D. in Computer Science

The doctoral program in computer science provides students with a deep grounding in the fundamental principles and practice of computer science through core and elective coursework. The program also prepares students to conduct novel research that advances the state of the art in the field of computer science. Students conduct research projects under the direction of a faculty mentor, culminating in the defense of a doctoral dissertation. Graduates of the program are expected to excel in research, teaching, and the practice of computer science.

Admission Requirements

Applicants must have earned a Baccalaureate degree from an accredited university. Students apply through the Graduate School by submitting an application and the following supporting materials:

- Official transcripts of all previous academic work.
- Applicants whose degrees are from non-English speaking institutions are required to demonstrate English proficiency. Please consult the Graduate School (https://www.utep.edu/graduate/future-students/applicant-timelines.html) website for required scores.
- Personal Statement of Purpose.
- A minimum of two letters of recommendation.
- A CV/resume with evidence of other relevant experience.

Depending on qualifications for study, students may need to complete leveling coursework at the undergraduate level. These courses are not applied towards the degree. Applicants must be able to demonstrate knowledge of programming in a high-level language such as Java or C++, including knowledge of data structures and algorithms. This can be demonstrated by completing CS 2302 Data Structures with a B or better, or by completing equivalent coursework or certifications as approved by the program committee. Additional leveling courses may be required as prerequisites for specific graduate courses, or on a case-by-case basis depending on the qualifications of the student.

Degree Requirements

The PhD program requires a minimum of 36 credit hours of coursework beyond the bachelor's degree, and 36 credit hours of research, seminar, and dissertation courses. Students who enter the program with a relevant Master's degree qualify for reduced coursework, with a minimum of 15 hours of coursework. All courses must be taken at the 5000-level or above, unless specifically approved by the graduate advisor; when possible PhD students should take 6000-level courses. The coursework and research credit requirements are summarized in the following table.

Table 1 summarizes the degree requirements. The descriptions follow.

Code	Title	Hours
Table 1: Degree Requirements Summary		
Core Courses		9
Breadth Courses		12
Technical Electives		12
Interdisciplinary Electives		3
Doctoral Research		27
Dissertation		6
Doctoral Seminar		3
Total Hours		**72**

Core Courses (9 credit hours):

The following three (3) core courses are required for all students and must be completed with a B or better.

Code	Title	Hours
CS 6392	Graduate Research Methods	3
CS 6315	Theory of Computation	3
CS 6350	Advanced Algorithms	3
Total Hours		**9**

Breadth Courses (12 credit hours):

To fulfill the breadth requirement, students must complete at least one course from four of the following five areas of computer science. All courses must be completed with a B or better.

Code	Title	Hours
Area 1: Systems		
CS 6313	Computer Networks	3
CS 6340	Advanced Operating Systems	3
CS 6341	Adv Computer Architecture	3
Area 2: Security		
CS 6352	Computer Security	3
CS 6375	Software Reverse Engineering	3
CS 6376	Comp. Dec Making & Risk Anal	3
CS 6377	Cyber-Sec for Critical Op Tech	3
Area 3: Software Development		
CS 6382	Model-Based Software Devlpmnt	3
CS 6385	Software Requirements Engr	3
CS 6386	Software Architecture & Design	3
CS 6387	Software Integration and V&V	3
Area 4: Intelligent and Interactive Systems		
CS 6314	Artificial Intelligence I	3
CS 6317	Human-Computer Interaction	3
CS 6303	Logical Foundations of CS	3
Area 5: Data Management and Analytics		
CS 6342	Database Management	3
CS 6361	Machine Learning	3
CS 6362	Data Mining	3

Technical Electives (12) credit hours:

Students must select at least 12 credit hours of technical elective courses in computer science. These courses should be selected in consultation with the research advisor and graduate program advisor to develop technical depth in the student's specific area of research interest.

Interdisciplinary Elective (3) credit hours:

Students must take at least one graduate-level course outside of the computer science department to develop exposure to interdisciplinary topics that complement the student's area of study.

Doctoral Research (27) credit hours:

Students must take at least 27 hours of doctoral research credits.

Dissertation (6) credit hours:

Students must take a minimum of six (6) hours of dissertation credits. These credits may only be taken after passing the comprehensive examination (dissertation proposal).

The dissertation must demonstrate competence in scholarly exposition and the ability to do independent research. It should present original investigations at an advanced level on a significant problem in computer science and should provide the basis for a publishable contribution to the research literature in the field. The rules for the dissertation and dissertation defense will follow the guidelines set forth by the Graduate School at UTEP.

Doctoral Seminar (3) credit hours:

Students are expected to actively participate in departmental seminars and other scholarly activities. During the program, they must complete at least 3 hours of seminar credits.

Students Entering with a Relevant MS Degree

Students entering with a relevant Master's degree must satisfy the core requirements of the PhD program through coursework or transfer credits and must complete a minimum of 15 credit hours of technical coursework in the PhD program. The specific coursework will be determined in consultation with the graduate advisor.

Examinations

Doctoral students must complete a qualifying examination, a comprehensive examination, and a final dissertation defense. The detailed requirements for each examination can be found on the departmental website.

The qualifying examination is designed to ensure that students are prepared to conduct research at the PhD level. This includes assessing graduate-level mastery of fundamental concepts in computer science, as well as written and oral communication skills.

The comprehensive examination is a written and oral defense of a dissertation proposal. This is designed to ensure that the student has identified a relevant research problem, outlined a feasible and sound approach to address the problem/research questions, and acquired sufficient depth of knowledge in the topic area to perform new and significant research. Upon successful

completion of the examination, the chair of the student's dissertation committee will inform the graduate school that the student is ready to begin work on his or her final dissertation, and the student will be admitted to candidacy.

The culmination of the PhD is writing and defending a dissertation. Students must submit a written dissertation following the guidelines published by the graduate school and defend the dissertation in a public defense before an approved dissertation committee.

Cybersecurity Certificate

The department also offers a certificate in cyber security that can be obtained in combination with the PhD degree if the student selects the necessary courses as electives. See the description of the certificate program for the detailed requirements.

Degree Plan

Required Credits: 72

Code	Title	Hours
PhD in Computer Science Program		
(All courses require a grade of C or better)		
Core Courses:		**9**
Core Courses (9) credit hours (B or above is required for the following three (3) courses):		
CS 6315	Theory of Computation	
CS 6350	Advanced Algorithms	
CS 6392	Graduate Research Methods	
Breadth Courses (12) credit hours (All courses require a B or better):		**12**
Area 1: Systems		
CS 6313	Computer Networks	
CS 6340	Advanced Operating Systems	
CS 6341	Adv Computer Architecture	
Area 2: Security		
CS 6352	Computer Security	
CS 6375	Software Reverse Engineering	
CS 6376	Comp. Dec Making & Risk Anal	
CS 6377	Cyber-Sec for Critical Op Tech	
Area 3: Software Development		
CS 6382	Model-Based Software Devlpmnt	
CS 6385	Software Requirements Engr	
CS 6386	Software Architecture & Design	
CS 6387	Software Integration and V&V	
Area 4: Intelligent and Interactive Systems		
CS 6314	Artificial Intelligence I	
CS 6317	Human-Computer Interaction	
CS 6303	Logical Foundations of CS	
Area 5: Data Management and Analytics		
CS 6342	Database Management	
CS 6361	Machine Learning	
CS 6362	Data Mining	
Technical Electives (12) credit hours:		**12**
Select twelve additional credit hours of technical electives in CS, Courses should be selected in consultation with the research advisor and graduate program advisor.		
CS 6194	Doctoral Research	
CS 6294	Doctoral Research	

CS 6303	Logical Foundations of CS
CS 6313	Computer Networks
CS 6314	Artificial Intelligence I
CS 6315	Theory of Computation
CS 6317	Human-Computer Interaction
CS 6319	Topics in Language Processing
CS 6334	Parallel & Concurrent Program
CS 6339	Secure Web-Based Systems
CS 6340	Advanced Operating Systems
CS 6341	Adv Computer Architecture
CS 6342	Database Management
CS 6350	Advanced Algorithms
CS 6351	Interval Computations
CS 6352	Computer Security
CS 6354	Topics/Intelligent Computing
CS 6361	Machine Learning
CS 6362	Data Mining
CS 6363	Computer Vision
CS 6364	Topics in Data Science
CS 6371	Software Safety & Risk Anlysis
CS 6372	Spec. & Desgn of Real-Time Sys
CS 6373	Graduate Student Internship
CS 6374	Software Construction
CS 6375	Software Reverse Engineering
CS 6376	Comp. Dec Making & Risk Anal
CS 6377	Cyber-Sec for Critical Op Tech
CS 6381	Topics in Software Engineering
CS 6382	Model-Based Software Devlpmnt
CS 6386	Software Architecture & Design
CS 6387	Software Integration and V&V
CS 6388	Software Project Management
CS 6389	Software Engineering Practicum
CS 6390	Special Topics
CS 6391	Individual Studies
CS 6392	Graduate Research Methods
CS 6394	Doctoral Research
CS 6396	Graduate Projects
CS 6397	Graduate Projects
CS 6694	Doctoral Research

Interdisciplinary Electives (3 credit hours):		**3**

Students must take at least one graduate-level course outside of the computer science department to develop exposure to interdisciplinary topics.

Doctoral Research (27 credit hours):		**27**
CS 6194	Doctoral Research	
CS 6294	Doctoral Research	
CS 6394	Doctoral Research	
CS 6694	Doctoral Research	
Dissertation (6 credit hours)		**6**
CS 6398	Dissertation	
& CS 6399	and Dissertation	
Doctoral Seminar (3 credit hours)		**3**
Total Hours		**72**