COMPUTER SCIENCE, PHD

Banner Code: EC-PHD-CS

Academic Advising

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The PhD program in Computer Science prepares students to become technical leaders in their fields of research. We have a world-class faculty with research expertise in a diverse set of computer science areas and our program is nationally ranked. Additionally, we are located in in the suburbs of Washington, DC at the center of one of the largest computer science and information technology corridors in the nation and a major center for science and engineering research and funding. Our PhD graduates have been highly successful both in academic and industrial positions.

The Computer Science PhD program requires coursework, successful completion of a breadth requirement, comprehensive examination, and a doctoral dissertation that is first proposed and eventually defended. Mason's general doctoral requirements (https://catalog.gmu.edu/policies/academic/graduate-policies/#text) apply to this program.

Admissions & Policies

Admissions

All applicants must have an undergraduate degree, and their prior academic work must show a strong academic background in computer science or computing. In addition, the GRE General Test is recommended for applicants who do not have academic degrees from a US university. Finally, each applicant must provide a resume, a brief statement of career goals and personal aspirations, and two letters of reference. Each application receives careful consideration from the PhD Admissions Committee.

Policies

Program Requirements

The 72 hours of required doctoral-level credits typically consist of 48 credits of regular coursework and 24 credits of dissertation research.

Requirements

Degree Requirements

Total credits: 72

Doctoral Coursework

Code	Title	Credits
The 48 credits of regular coursework required for the degree are as follows:		
CS 600	Theory of Computation (must be completed with a B+ or better)	3
CS 700	Research Methodology in Computer Science (must be completed with a B or better)	3
CS 701	Research Experience in Computer Science (must be completed with a B or better)	3
CS 800	Computer Science Colloquium (must enroll in course for two semesters)	0
Nine credits of advanced graduate courses [1]		9
30 credits of graduate level courses in the Computer Science department or a field related to the student's doctoral research area [2]		30
Total Credits		48

[1] Must be selected in consultation with the student's advisor from a list maintained by the CS department. Independent study courses cannot be used towards the 9 credit hours that must be obtained in advanced graduate courses.

[2] Must be selected in consultation with the student's advisor.

Note:

With careful selection of courses, students may earn an MS degree as part of their PhD studies.

Reduction of Credit

Students entering the PhD program with an approved MS degree can receive a reduction of credit for up to 30 credits. Reduction of credit requires the approval of the program director or designee and the dean or designee of the school.

Breadth Requirement

Students must demonstrate breadth of knowledge in computer science by obtaining superior grades in four graduate courses, including CS 583 Analysis of Algorithms. The four courses must span at least three of the following eight areas: Artificial Intelligence, Databases, Programming Languages, Security, Software Engineering, Systems and Networks, Theoretical Computer Science, and Visual Computing.

The grades obtained in the four selected courses must meet the following requirements:

- Students must obtain an A- or better grade in at least three of the four courses
- In the fourth course, students must obtain a grade of B or better

A list of courses that can be used to satisfy the breadth requirement is maintained by the CS department.

A course that is used to satisfy the breadth requirement may be repeated at most once (the grade received in the last attempt is considered when evaluating the breadth requirement).

To satisfy the breadth requirement, students may use the grades received in the past, provided that no more than five years elapsed since the course was taken. The course must have been taken at GMU. Exceptions to this rule are rare and require filing a petition with supplementary documents to the Computer Science department.

An alternative way to satisfy the breadth requirement is to pass the written qualifying exams (https://cs.gmu.edu/current-students/doctoral-students/breadth-requirement/qualifying-exams/). The exams

are offered once every semester (usually two weeks before the semester begins).

To qualify, each student must pass exams in **four areas**, one of which is *Foundations of Computer Science*. The other three areas are chosen from these eight areas: *artificial intelligence, compilers and languages, computer systems, database systems, information security*, *networks, software construction,* and *software testing*.

The four exams must be attempted in the same semester, and a failed exam may be retaken once only, in the next semester. A student who fails to pass the four exams in two consecutive semesters is deemed to have failed to satisfy the breadth requirement, and is subject to termination.

If the student takes one or more written qualifying exams, the breadth requirement can only be satisfied by passing the qualifying exams (the criterion based on course performance cannot apply).

Research Advisor

Students are required to declare a PhD Research Advisor within the first 24 first credits in the program, or within three years, whichever comes first. Students declare their Research Advisor by submitting a form maintained on the department's website. The advisor selection must be signed by the CS PhD Program Director. Affiliate faculty in the CS Department may co-advise students with a member of the department. The PhD Research Advisor must be a tenured or tenure-track member of the Graduate Faculty in the Computer Science department. If the student changes research advisor, a new form must be submitted to the CS Department by the end of the semester when the change occurs.

Comprehensive Exam

To demonstrate the depth of knowledge in their intended area of research, the students must pass a comprehensive exam. The comprehensive exam is administered by a committee consisting of four members: the research advisor, an additional faculty member selected by the student, and two tenured CS faculty members selected by the PhD program director. The additional faculty member selected by the student must be a member of the graduate faculty. One of the members selected by the program director chairs the committee.

The comprehensive exam has both written and oral components. The student is required to initiate the comprehensive exam procedure by submitting a form to the CS department at least four months prior to the target oral exam date. For the written component of the exam, the student prepares a critical review of research literature on a topic in the intended area of research. The report should synthesize the previous research in the target area with particular emphasis on open problems. The report should be 8-10 pages long and should contain a minimum of 20 references. The written report must be received by the committee members at least one month before the oral exam date.

The oral exam includes a presentation by the student based on the written report. The duration of the oral exam is typically two hours with the presentation limited to 20 minutes. The exam is public but only the members of the committee are permitted to ask questions.

The scope of the oral exam is defined by a **reading list** that includes research articles selected by the student and advisor, as well as the textbooks and articles related to the intended **broader** research area of the student selected by the other members of the committee and the CS department. The complete reading list, as well as the members of the examination committee, will be finalized and communicated to the student by the CS department at least three months before the oral exam

date. The comprehensive exam reading list becomes part of the student's record.

When in **both** written and oral components, at least three out of four committee members find the student's performance satisfactory, the student passes the comprehensive exam. Otherwise the student is allowed to re-take the exam only once (with both written and oral components) and no later than the next semester. If the written report is found unsatisfactory by two or more committee members, the oral exam is not administered in that attempt. Students who fail the comprehensive exam are subject to termination.

The student can form a dissertation committee only after successfully passing the comprehensive exam.

Dissertation Research

A minimum of 24 credits of CS 998 Doctoral Dissertation Proposal and CS 999 Doctoral Dissertation must be completed, of which at least 12 must be in CS 999 Doctoral Dissertation. Only 24 credits of CS 998 Doctoral Dissertation Proposal and CS 999 Doctoral Dissertation may be applied toward the degree. Students may enroll in CS 998 Doctoral Dissertation Proposal only after passing the breadth requirement, and they may enroll in CS 999 Doctoral Dissertation only after advancing to candidacy.

Code	Title	Credits
Select 24 credits from the following:		24
CS 998	Doctoral Dissertation Proposal	
CS 999	Doctoral Dissertation (minimum 12 credits required)	

Milestones and Deadlines

The students are expected to make steady progress in the program by completing the required coursework and research-related milestones within the specified deadlines. Students who fail to meet the deadlines will be dismissed from the program unless there are extenuating circumstances approved by the department.

Successful completion of CS 700 Research Methodology in Computer Science: Within the first two semesters in the program.

Successful completion of CS 701 Research Experience in Computer Science: Within the first 18 credits in the program.

Determining the research advisor: Within the first 24 credits in the program or three years, whichever comes first.

Satisfy the breadth requirement: Within the first 24 credits in the program or three years, whichever comes first.

Successful completion of both instances of CS 800 Computer Science Colloquium: Within the first 36 credits in the program or five years, whichever comes first.

Taking the comprehensive exam: Within the first 36 credits in the program or five years. The student must pass the exam in at most two attempts.

Advancing to candidacy and graduation: Time limits are determined by the general university rules that apply to the PhD programs.

A student who misses any deadline is subject to termination.

Annual Evaluation

All students in the program (except students in their first year in the PhD program) are required to complete an annual progress report (http://cs.gmu.edu/resources/student-forms/). This report must be submitted **by the end of September** every year to the CS PhD program director.

The annual reports are reviewed by members of the faculty to assess the student's progress in the program and feedback is provided to each student.

Dissertation Committee Selection

Each student must form a dissertation committee, comprising four or five individuals. Three members of the committee must be Graduate Faculty in the Computer Science Department. The fourth member should be a member of the George Mason University graduate faculty who is outside the department. The chair of the dissertation committee, who must also be the dissertation director, must be a member of the Graduate Faculty in the College of Engineering and Computing. The committee must be approved by the chair of the Computer Science Department.

Dissertation Proposal

Each student must prepare a written dissertation proposal. While preparing this proposal, the student enrolls in CS 998 Doctoral Dissertation Proposal. The proposal must be made available to the committee at least two weeks in advance of the presentation. The proposal must be presented to and approved by the dissertation committee. The committee determines whether the proposal has merit and can lead to significant contributions to the area and whether the student has the knowledge and skills to complete the proposed work successfully and in a timely manner. Students may present their dissertation proposal only after passing the comprehensive exam, and the presentation may not be on the same day as the comprehensive exam. If the student fails to defend the proposal, the student may present a dissertation proposal a second time at a later date. Failure in the second attempt results in termination from the program. The student advances to candidacy after passing the proposal defense and successfully completing all required coursework (except CS 999).

Dissertation Preparation and Defense

While preparing the dissertation, the candidate must enroll in CS 999 Doctoral Dissertation each term. When the work is deemed complete, the candidate defends the dissertation. The public defense is preceded by a pre-defense meeting in which only the candidate, the dissertation committee members, and the director of the PhD in Computer Science Program (or his or her representative) are present.

The dissertation must be made available to the committee at least two weeks before the pre-defense, see AP.6.10.8. (https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-10-8) If the committee approves, the candidate may then schedule the final public defense.

There must be at least one month between the pre-defense meeting and the defense, and the defense must be announced at least two weeks in advance. The final dissertation must be made available to the committee at least two weeks before the defense. The entire dissertation committee must be present at the defense, unless an exception is approved by the PhD in Computer Science program director in advance of the defense.

The dissertation must make significant contributions to its area and be publishable in refereed journals or conferences. If the candidate defends the dissertation successfully, the dissertation committee recommends that the final form of the dissertation be completed under the supervision of the dissertation director and the graduate faculty of Mason accept the candidate for the PhD degree. If the candidate fails to defend the dissertation, the candidate may request a second defense, following the same procedures as for the initial defense. There is no time limit for this request other than general time limits for the doctoral degree (see AP.6.10.1 (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/computer-science-phd/: https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-10-1)) and an additional pre-defense is not required. A candidate who fails a second attempt to defend the dissertation is terminated from the program.