Program Policy for the PhD in Computer and Information Sciences

The Doctor of Philosophy Degree in Computer and Information Sciences (the PhD) program is designed for students who are interested in research in computer and information sciences.

Admission Requirements

Admission to the program is competitive. Those who meet stated minimum requirements are not guaranteed admission, nor are those who fail to meet all of those requirements necessarily precluded from admission if they offer other appropriate strengths.

Minimum requirements:

- the equivalent of a bachelor's degree at the University of Delaware. A minimum grade average of 3.2 in the major field of study and an overall cumulative index of 3.0 is required.
- scholarly competence in mathematics and computer programming. Applicants are expected to know the material covered by at least one undergraduate course in each of the following topics: structured high-level language programming; data structures; computer architecture; operating systems; and analysis of algorithms. Additionally, applicants must have completed the equivalent of at least four undergraduate courses in the following topics: calculus; discrete mathematics; probability and statistics; mathematical logic; or comparable formal subjects, such as theory of computation.
- minimum GRE scores of 153 for the verbal section, 155 for the quantitative section, and 4.0 for the analytical writing section. The GRE subject test is not required.
- a satisfactory level of proficiency in the English language. For international applicants, the University of Delaware requires an official TOEFL score of at least 79 on the Internet-based test. A TOEFL score of at least 100 is required to be considered for a teaching assistantship.
- three (3) letters of recommendation from professors (preferably), employers, or others that assess the applicant's potential for success in the program.

Application Process and Deadlines

Applicants should submit all required materials using the University's graduate application website.

For admission for Fall semesters, all application materials must be received by July 1. To be considered for Departmental funding, all application materials must be received by February 1.

For admission for Spring semesters, all application materials must be received by December 1.

Degree Requirements

The PhD is an individualistic degree. Students must work closely with their PhD advisor to design a plan of study that prepares them to complete the degree program. A student's PhD advisor may impose additional requirements beyond what is specified in this document.

The PhD is a research degree. Students must carry out a program of substantial, original, and publishable research; prepare a written dissertation; and demonstrate mastery of their research.

Students who believe that they have already satisfied a degree requirement (e.g., by taking prior graduate-level coursework), may submit a degree requirements modification request.

Satisfactory Progress

The program is divided into a series of milestones that establish the timeline that students must follow in order to make satisfactory progress towards the PhD. The windows associated with the milestones begin with the date of matriculation in the program.

1. Students must satisfy the breadth component of the coursework requirements within a one-year window.

2. Students are strongly encouraged to pass the preliminary examination within a one-year window and must pass the preliminary examination within a two-year window.

3. Students are strongly encouraged to enter candidacy (i.e., complete the coursework, preliminary examination, and qualifying examination requirements) within one year of passing the preliminary examination and must enter candidacy within a four-year window.

4. Students are strongly encouraged to pass the dissertation examination within a five-year window and must pass the dissertation examination within a seven-year window.

Students who accept Departmental funding may be expected to follow an alternative timeline in order to make satisfactory progress.

If, due to extenuating circumstances, a student anticipates not making satisfactory progress, they may request an accommodation by petitioning the Graduate Education Committee.

If a student fails to make satisfactory progress, all Departmental funding will be terminated and a recommendation to dismiss them from the program may be made.

Coursework Requirements

The coursework requirements comprise four components. The breadth component ensures that students have a broad view of computer and information sciences. The elective component allows students to specialize in an area that is related to their dissertation research or career goals. The seminar component prepares students to successfully complete the PhD and exposes them to broader issues such as professional and ethical responsibilities and the impacts of computer and information sciences on society. The dissertation component ensures that students have time to devote to their research.

Breadth Component

Students must complete 12 credits of breadth courses, at least 3 credits from each of the following areas:

- Theory, Mathematical, and Formal Reasoning
- System Design and Implementation
- ML/AI, Interacting with Data, and Statistical Applications
- Human-facing

Breadth courses must be taken using the standard grading option (i.e., letter grades). The GPA of the breadth courses must be at least 3.5. When calculating the GPA of the breadth courses, only the grade associated with the first attempt at a course will be counted and “L”, “LW”, and “W” will be treated as “F”.

A breadth course may satisfy multiple areas. However, the same breadth course may not be used to satisfy more than one area.

Elective Component

Students must complete 9 credits of elective courses.

Elective courses must be taken using the standard grading option (i.e., letter grades).

Students are encouraged to use graduate-level courses in areas outside of computer and information sciences to satisfy this requirement. Students who wish to do so must submit a course substitution request.

Seminar Component

Prior to entering sustaining status, students must register for and satisfactorily participate in the Departmental seminar (CISC890) each semester. Subsequent to entering sustaining status, students must continue to satisfactorily participate in the Departmental seminar each semester.

Dissertation Component

Students must complete 9 credits of Doctoral Dissertation (CISC969).

Research Requirements

The research requirements comprise three components. The preliminary examination ensures that students have the ability to perform research in a chosen area of computer and information sciences. The qualifying examination ensures that students are well positioned to successfully complete their dissertation research. The dissertation examination ensures that students have achieved mastery of their dissertation research.

Preliminary Examination

Students must pass the preliminary examination.

Each student must establish their preliminary examination committee.

Each student must author a report that describes the results of original research in a chosen area of computer and information sciences.

The student's preliminary examination committee must assess the student’s ability to conduct and report the results of basic research in both oral and written form. The assessment must include a public, oral defense of the report.

The outcome of the preliminary examination is decided by the Department.

Qualifying Examination

Students must pass the qualifying examination.

Each student, in consultation with their PhD advisor, must establish their advisory committee. The advisory committee must be approved by the Department.

Each student must author a proposal that describes their proposed dissertation research.

The student’s advisory committee must assess the student’s ability to conduct their proposed dissertation research. The assessment must include a public, oral defense of the proposal.

The outcome of the qualifying examination is decided by the student’s advisory committee. A majority vote in favor is needed to pass.

Dissertation Examination

Students must pass the dissertation examination.

Each student must author a dissertation that describes the results of original and significant research written in English and in a scholarly and competent manner worthy of publication.

The student's advisory committee must assess the student's mastery of their research. The assessment must include a public, oral defense of the dissertation.

The outcome of the dissertation examination is decided by the student's advisory committee. A majority vote in favor is needed to pass.

Educational Goals

After completing the PhD, graduates will be able to:

- identify, analyze, and solve a broad range of computer and information sciences problems using appropriate tools, techniques, approaches, and algorithms as measured by the successful completion of the breadth component of the coursework requirements
- assess the impacts of computer and information sciences on society and a chosen discipline as measured by the successful completion of the elective component of the coursework requirements
- summarize the professional and ethical responsibilities related to computer and information sciences as measured by the successful completion of Responsible Conduct of Research training and the seminar component of the coursework requirements
- plan, conduct, present, and defend a research project as measured by the successful completion of the preliminary examination
- survey and critique the state-of-the-art in a chosen area of computer and information sciences as measured by successful completion of the qualifying examination
- contribute to scientific knowledge, the profession, and society via original and substantial research as measured by the successful completion of the dissertation examination
- effectively communicate technical information to a broad audience as measured by the successful completion of the dissertation examination

Financial Aid

Entering and continuing students are eligible for a variety of financial aid. Students who are admitted with Departmental funding (i.e., a teaching assistantship or a research assistantship) can expect a 5 year commitment, contingent on full time enrollment and satisfactory progress in the program.

University Funding

Students enrolled in the program are eligible for various assistantships, fellowships, and scholarships offered by the University.

Teaching Assistantships

The Department offers teaching assistantships to qualified students on a competitive basis.

Teaching assistantships cover tuition and provide a separate stipend.

Students who are awarded a teaching assistantship are expected to perform teaching and other instructional activities (e.g., grading, holding office hours, etc.) for up to 20 hours per week.

Students who apply to the program by the financial aid-deadline are automatically considered for a teaching assistantship; no separate application is necessary. Continuing students may apply for a teaching assistantship by contacting the Academic Coordinator.

Research Assistantships

Departmental faculty offer research assistantships to qualified students on a competitive basis. Research assistantships cover tuition and provide a separate stipend.

Students who are awarded a research assistantship are expected to spend 20 hours per week on their assigned duties.

To apply for a research assistantship, students should contact departmental faculty directly.

Departmental Operations

The following subsections describe the processes and procedures that Students (the Student) in the Department of Computer and Information Sciences (the Department) at the University of Delaware (the University) should follow. The keywords MUST, MUST NOT, SHOULD, SHOULD NOT and MAY should be interpreted according to RFC2119.

Degree Requirements Modification Request Process

To request a modification to their degree requirements, the Student MUST contact the Graduate Education Committee.

Degree requirements modification requests SHOULD be made as soon as possible after the Student matriculates.

Degree requirements modifications requests based on prior graduate-level coursework MUST include a copy of the Student's transcript that includes the name, number of credits, and grade received for the prior coursework. Additional information such as syllabi, assignments, examinations, etc. may be necessary.

The Graduate Education Committee MUST update the Student's degree audit to indicate any approved modifications.

Course Substitution Request Process

To request a course substitution, the Student MUST contact their PhD Advisor. If the Student has not identified an advisor, they MUST contact the Graduate Education Committee.

Course substitution requests MUST include (1) a copy of the Graduate Catalog entry for the course the Student is requesting to take and (2) a brief explanation of how the course relates to the Student's dissertation research or career goals.

Course substitution requests MUST be made prior to the Student enrolling in the course.

The Student's PhD Advisor (or the Graduate Education Committee) MUST update the Student's degree audit to indicate any approved substitutions.

Preliminary Examination Process

The purpose of the Preliminary Examination is to (1) assess the Student's ability to conduct and report the results of basic research in both oral and written form and (2) facilitate the establishment of productive PhD Advisor/Advisee relationships.

The Student SHOULD attempt the Preliminary Examination as soon as possible:

- Starting earlier increases options for dealing with both common issues (e.g., research setbacks) and unlikely problems (e.g., unproductive student/Chairperson relationships)
- Faculty may want to interact with the Student (e.g., in a class or by supervising a CISC666 project) before agreeing to serve as Chairperson.
- Funding decisions made by the Department take progress towards the PhD into consideration and higher priority is given to students who have passed the Preliminary Examination.

The Student MUST pass the Preliminary Examination within a two-year window starting from their date of matriculation in the program.

If, due to extenuating circumstances, the Student anticipates not passing the Preliminary Examination within their window, they MAY request an extension by petitioning the Graduate Education Committee. Such requests SHOULD be submitted as soon as possible.

The Student will fail the Preliminary Examination if they do not pass within their allotted time.

If the Student fails the Preliminary Examination, any Departmental funding MUST be discontinued and a recommendation to dismiss them from the program MAY be made to the Graduate College.

The Student MAY repeat any step of the process at any time and without prior approval.

Step 1: Establish the Area

The Student MUST determine the area of research (the Area). The ACM Computing Classification System or the Computer Science Ontology may be of use for this task. The Area SHOULD be refined after consultation with the Chairperson.

Step 2: Identify the Chairperson

The Student MUST identify the Chairperson for the Preliminary Examination. Multiple faculty MAY, jointly, fill the role of Chairperson.

The Chairperson:

- MUST be a tenure-track faculty member of the University with greater than 5% appointment in the Department
- MUST have an established track record of publication in the Area
- SHOULD become the Student's PhD Advisor, if the Student passes the Examination

Step 3: Define the Project

The Student MUST collaborate with the Chairperson to define the Preliminary Examination Research Project (the Project).

The Project:

- MUST be approved by the Chairperson
- MUST include a thorough literature search and a summary of the relevant literature in the Area
- MUST make an original contribution
- SHOULD have a reasonable expectation of leading to a publication in an appropriate venue

Step 4: Establish the Preliminary Examination Committee

The Student MUST consult with the Chairperson to establish the Preliminary Examination Committee.

The Preliminary Examination Committee MUST comprise at least two committee members.

The Chairperson MUST be a committee member of the Preliminary Examination Committee.

The Preliminary Examination Committee MUST include a Secondary Member. The Secondary Member:

- MUST be a full-time faculty member of the University with greater than 5% appointment in the Department
- MUST NOT have an established track record of publication in the Area
- SHOULD become the Secondary Area Member of the Student's Advisory Committee, if the Student successfully passes the Preliminary Examination

In addition to the Chairperson and the Secondary Member, the Preliminary Examination Committee MAY include Additional Members. An Additional Member MUST be a full-time faculty member of the University with greater than 5% appointment in the Department.

Step 5: Author the Report

The Student MUST author a report (the Report). The Student decides the format and content of the Report, but it:

- MUST describe the Project and its results
- MUST adhere to the expectations established by the Area's research community, as communicated by the Chairperson
- MUST be written in English and in a scholarly and competent manner
- SHOULD be submitted to an appropriate venue for publication

Step 6: Assessment

The Preliminary Examination Committee MUST assess the Student's ability to conduct and report the results of basic research in both oral and written form. The form of the assessment is decided by the Preliminary Examination Committee but it MUST include a public, oral defense of the Report, conducted in English.

The Student decides the time and date of the oral defense but it:

- MUST be acceptable to all members of the Preliminary Examination Committee
- SHOULD be during business hours (9am to 5pm EST, Monday through Friday)
- SHOULD take approximately one hour

The Student MUST email a copy of the Report to the Preliminary Examination Committee at least two weeks prior to the date of the oral defense. The Student MUST email a copy of the Report and the time, date, and location of the oral defense to the Graduate Coordinator at least two weeks prior to the date of the oral defense. The Graduate Coordinator will announce the date, time, and location of the oral defense to the Department.

The Preliminary Examination Committee MUST recommend an outcome to the Department. The Preliminary Examination Committee SHOULD strive to achieve consensus concerning the recommendation. In case of dissention, each Preliminary Examination Committee Member MUST submit an individual recommendation.

Step 7: Outcome of the Examination

The outcome of the Preliminary Examination is decided by the Department. The Department will consider all aspects of the Student's performance with particular consideration being given to:

- the recommendation(s) made by the Preliminary Examination Committee
- the willingness of a faculty member to serve as the Student's PhD Advisor
- the Student's coursework performance

The outcome MUST be either Pass, Retake, or Fail.

If the outcome is Pass, the Department MUST update the Student's degree audit to indicate that the Preliminary Examination requirement is satisfied.

If the outcome is Retake and the Student is within their allotted time, the Student MAY retake the Preliminary Examination. A subsequent attempt at the Preliminary Examination may start at any step in the process.

Qualifying Examination Process

The purpose of the Qualifying Examination is to ensure that the Student is well positioned to successfully complete their dissertation research.

The Student SHOULD pass the Qualifying Examination one year after passing the Preliminary Examination and MUST pass the Qualifying Examination within a four-year window starting from their date of matriculation in the program.

If, due to extenuating circumstances, the Student anticipates not passing the Qualifying Examination within their window, they MAY request an extension by petitioning the Graduate Education Committee. Such requests SHOULD be submitted as soon as possible.

If the Student does not pass the Qualifying Examination within their allotted time, any Department funding MUST be discontinued.

The Student SHOULD complete the Coursework Requirements by the end of the semester in which they plan to take the Qualifying Examination.

The Student SHOULD register for 9 credits of Pre-candidacy Study (CISC964) during the semester in which they plan to take the Qualifying Examination. Normally, students must wait until they have entered candidacy to register for 9 credits of Doctoral Dissertation (CISC969), which is a University-wide PhD degree requirement. However, Pre-candidacy Study credits completed during a semester can be converted to Doctoral Dissertation credits if a student achieves candidacy during that semester, or prior to the end of the drop/add period of the subsequent semester. This will allow the Student to enter candidacy and register for sustaining status, if all coursework is completed, immediately after passing the Qualifying Examination.

Step 1: Establish the Area

The Student MUST determine the area of the research (the Area). The ACM Computing Classification System or the Computer Science Ontology may be of use for this task.

Step 2: Establish the Advisory Committee

The Student MUST consult with their PhD Advisor to establish the Advisory Committee.

The Advisory Committee MUST comprise at least four Committee Members.

Each of the following roles MUST be filled: Chairperson, Primary Area Member, Secondary Area Member, and External Member.

An Advisory Committee Member MUST NOT fulfill more than one role.

An Advisory Committee Member who does not fulfill a role is a Member at Large.

Advisory Committee Members who retire or resign from the University may serve on the Advisory Committee of a student whose work began under their direction prior to their retirement or resignation from the University.

The Chairperson

- MUST be the Student's PhD Advisor. If the Student has multiple PhD Advisors, the Advisors, jointly, fill the role of Chairperson.

The Primary Area Member

- MUST be a full-time faculty member of the University with greater than 5% appointment in the Department
- MUST have an established track record of publication in the Area

The Secondary Area Member

- MUST be a full-time faculty member of the University with greater than 5% appointment in the Department
- SHOULD NOT have an established record of publication in the Area
- SHOULD be the Secondary Member of the Student's Preliminary Examination Committee

The External Member

- MUST NOT be a full-time faculty member of the University with greater than 5% appointment in the Department
- MUST have an established record of publication in the Area
- SHOULD be external to the University

A Member at Large

- MUST have an established record of publication in the Area

The Advisory Committee MUST be approved by the Department. The Student MUST request Departmental approval of the Committee by contacting the Graduate Coordinator.

The Department MUST approve any change to an approved Advisory Committee. The Student MUST request Departmental approval of any change to an approved Committee by contacting the Graduate Coordinator.

Step 2: Author the Proposal

The Student MUST author a Proposal (the Proposal). The Student decides the content and format of the Proposal but it:

- MUST describe a plan for conducting original and significant research that will be conducted by the Student
- MUST be written in English and in a scholarly and competent manner

Step 3: Assessment

The Advisory Committee MUST assess the Student's ability to conduct their proposed dissertation research. The form of the assessment is decided by the Advisory Committee but it MUST include a public, oral defense of the Proposal, conducted in English.

The Student decides the time and date of the oral defense but it:

- MUST be acceptable to all members of the Committee
- SHOULD be during business hours (9am to 5pm EST, Monday through Friday)
- SHOULD take approximately two hours

The Student MUST email a copy of the Proposal to the Advisory Committee at least three weeks prior to the date of the oral defense. The Student MUST email a copy of the Proposal and the time, date, and location of the oral defense to the Graduate Coordinator at least three weeks prior to the date of the oral defense. The Graduate Coordinator will announce the date, time, and location of the oral defense to the Department.

Step 4: Outcome of the Examination

The outcome of the Qualifying Examination is decided by the Advisory Committee. The Advisory Committee SHOULD strive to achieve consensus concerning the outcome. In case of dissenting votes, a majority vote in favor is needed to pass the Qualifying Examination.

If the outcome is Pass, the Chairperson of the Advisory Committee MUST update the Student's degree audit to indicate that the Qualifying Examination requirement is satisfied.

Candidacy Application Process

To apply for candidacy, the student MUST email a completed copy of the Doctoral Degree Recommendation Form (DDR) to the Graduate Coordinator.

The Graduate Coordinator will:

1. review the submitted DDR
2. verify that the Student has satisfied the Coursework, Preliminary Examination, and Qualifying Examination Requirements
3. complete Section 2 of the DDR by obtaining the Department Chairperson's signature, dating the form, and checking the APPROVED box
4. provide a copy of the completed DDR to the Student and the Graduate College
5. store the completed DDR and submitted materials in the Department's records

Upon receipt of the completed DDR, the Graduate College will convert Pre-Candidacy (CISC964) credits to Doctoral Dissertation (CISC969) credits, if applicable, and will register the Student in Sustaining Status.

Instructions for Completing the DDR

In Section 1, the Student MUST

- enter "Computer Science" under MAJOR
- check "Yes" for ARE ALL REQUIRED COURSES COMPLETED
- check "No" for DOES THE DEGREE REQUIRE TEACHING EXPERIENCE
- leave COMPETENCY EXAMINATIONS OR OTHER REQUIRED EXAMS blank

In Section 3, the Student MUST enter the full name of each member of their PhD Advisory Committee in the appropriate location. If the Student has multiple PhD Advisors, all advisors MUST be listed in as the DISSERTATION CHAIR.

In Section 2, the Student MUST

- obtain the signature of each committee member. Each committee member should type and sign their name in the area corresponding to the location of their name in Section 3. Committee members listed as MEMBER in Section 3 should sign next to their typed name in Section 3.
- leave the name and signature of DEPARTMENT CHAIRPERSON, DATE, and the APPROVED/NOT APPROVED boxes blank

Dissertation Examination Process

The purpose of the Dissertation Examination is to ensure that the Student has achieved mastery of their dissertation research.

The Student SHOULD pass the Dissertation Examination one year after entering candidacy. If the Student entered the program *with* a masters degree, they MUST pass the Dissertation

Examination within a five-year window starting from their date of matriculation in the program. If the Student entered the program *without* a masters degree, they MUST pass the Examination within a seven-year window starting from their date of matriculation in the program.

If, due to extenuating circumstances, the Student anticipates not passing the Examination within their window, they MAY request an extension by petitioning the Graduate Education Committee. Such requests SHOULD be submitted as soon as possible.

If the Student does not pass the Dissertation Examination within their allotted time, any Department funding MUST be discontinued.

After passing the Dissertation Examination, the Student MUST follow the Graduate Degree Application Process found below.

The Student MUST undertake all of the following steps with the help and guidance of their Advisory Committee.

Step 1: Author the Dissertation

The Student MUST author a Dissertation (the Dissertation). The Student decide the content and format of the Dissertation but it:

- MUST describe the results of original and significant research, conducted by the Student
- MUST be written in English and in a scholarly and competent manner

Step 2: Assessment

The Advisory Committee MUST assess the Student's mastery of their research. The form of the assessment is decided by the Advisory Committee but it MUST include a public, oral defense of the Dissertation, conducted in English.

The Student decides the time and date of the oral defense but it:

- MUST be acceptable to all members of the Advisory Committee
- SHOULD be during business hours (9am to 5pm EST, Monday through Friday)
- SHOULD take approximately two hours

The Student MUST email a copy of the Dissertation to the Advisory Committee at least three weeks prior to the date of the oral defense. The Student MUST email a copy of the Dissertation and the time, date, and location of the oral defense to the Graduate Coordinator at least three weeks prior to the date of the oral defense. The Graduate Coordinator will announce the date, time, and location of the oral defense to the Department.

Step 3: Outcome of the Examination

The outcome of the Dissertation Examination is decided by the Advisory Committee. The Advisory Committee SHOULD strive to achieve consensus concerning the outcome. In case of dissenting votes, a majority vote in favor is needed to pass the Dissertation Examination.

If the outcome is Pass, the Chairperson of the Advisory Committee MUST update the Student's degree audit to indicate that the Dissertation Examination requirement is satisfied.

Degree Application Process

To apply for the PhD degree, the Student MUST email a completed copy of the Advanced Degree Application (AAD) to the Graduate Coordinator.

The Graduate Coordinator will:

1. review the submitted AAD
2. verify that the Student has satisfied or, by the end of the current semester, will satisfy the Degree Requirements
3. complete Section 6 of the AAD by obtaining the necessary signatures and approvals
4. provide a copy of the completed AAD to the Student and the Graduate College

Instructions for Completing the AAD

The Student MUST read the 8 numbered items under the PLEASE NOTE heading on the first page.

In Section 1:

- The Student MUST enter "Computer Science" under MAJOR and MUST leave CONCENTRATION blank.
- The Student MUST enter the sum of the credits of the courses listed in Section 5 under TOTAL CREDITS REQUIRED FOR THE DEGREE.

In Section 3, the Student MUST check only the box for PhD Doctor of Philosophy.

In Section 4, the Student MUST check only the box for Dissertation/Education Leadership Portfolio.

In Section 5:

- The Student MUST list only courses that appear on their transcript

- The Student MUST list only courses that satisfy a degree requirement. Enter the grade for the course under GR and the number of credits under CR. Courses in which the Student is currently enrolled MUST be listed; leave the grade blank.

In Section 6:

- The Student MUST have the Chairperson of their Advisory Committee sign as advisor.