

Doctor of Philosophy in Computer and Information Sciences

May 15, 2023

The Computer and Information Science Ph.D. program prepares a student to undertake independent research leading to science and engineering advances in computer and information sciences. The program is structured around the Ph.D. dissertation, with coursework and seminars designed to attain the requisite quality of the dissertation. An important criterion for the dissertation is that it be publishable in a recognized journal and presentable at international conferences.

1. Areas of Specialization

The Ph.D. program focuses on four research tracks:

- **Artificial Intelligence and Applications (AI)**, which is concerned with systems that exhibit intelligent behavior; (Track Chair: Dr. [Longin Jan Latecki](#))
- **Computer and Network Systems (NS)**, which covers systems programming, operating systems, and system architectures, including networks and distributed systems; (Track Chair: Dr. [Jie Wu](#))
- **Information Systems (IS)**, which focuses on systems that provide information to improve the performance of organizations; (Track Chair: Dr. [Zoran Obradovic](#))
- **Software Systems (SS)**, which is dedicated to the creation of software and its associated methodologies. (Track Chair: Dr. [Justin Shi](#))

Different tracks have different requirements on track-specific courses (24 credits) and topics in qualifying exam. Please work with your advisor to select your track after you enter the Ph.D. program.

2. Summary of Course Requirements

The detailed course requirements can be found at the [official bulletin](#):

- Students must take **24 credits** of track-specific courses (8 courses) from among those approved for their track. Please refer to the [official bulletin](#) for a detailed course list for each track.
- Students select **6 credits** of research preparation courses (which could be CIS 9182 or CIS 9282 Independent Study, or graduate-level (CIS 5500 level or above) courses, or graduate courses from related domains aligned with the student's research area approved by the faculty advisor)
- Student must take at least **6 credits** research courses (CIS 9994 Preliminary exam prep, CIS 9998 Pre-dissertation research, and CIS 9999 Dissertation research). At least 2 credits of the 6 credits are required to be from CIS 9999.

Total credit hours requested is **36**.

- To register CIS 9182/9282, 9994, 9998, 9999, please submit “**Ph.D. Course Enrollment Form**” to the Graduate Program Administrative Coordinator.
- Graduate credits from other institutions can be transferred via Advance Standing by a case-by-case basis. Please submit the Graduate School “**Request for Advanced Standing or Transfer of Graduate Credit**” Form to the Graduate Program Administrative Coordinator.

Advanced Standing: Students who enter the Ph.D. program with graduate credits in Computer Science or a closely related field may be considered for advanced standing. The CIS Graduate Committee recommends the awarding of advanced standing on a case-by-case basis. The credits must be equivalent to coursework offered at Temple, with a grade of "B" or better having been earned in the course(s). The maximum number of advanced standing credits awarded is 24. Students are encouraged to the approval from their track chair for advanced standing. Note that the transferred courses via advanced standing cannot use to waive the topic in the qualifying exam.

3. Summary of Milestones and Exam Requirements

Each student progresses through the Ph.D. program at a different pace, which may depend on your research topic or background. There are four milestones in the CIS Ph.D. program:

- **Qualifying Exam**
- **Prelim Exam I**
- **Prelim Exam II**
- **Dissertation Defense**

Detailed requirements of these milestones are listed below.

4. Ph.D. Qualifying Exam (revised in May 2023)

The Qualifying Examination tests the student on the fundamentals of Computer and Information Science and the basic body of knowledge in a track. It consists of a written exam on theory and algorithms, systems, and track-specific material. The Qualifying Exam is usually given every Spring semester (usually in February). The exam consists of four sets of written questions.

Note:

- Questions on individual courses may be waived if the student has taken the course at Temple University within four years of admission to the doctoral program and received a grade of A or A- in that course. **Transferred credits via advance standing do not satisfy the waiver.**
- Students **need not** take a course at Temple in order to take the QE for that course. For example, a student can take the QE for OS without taking the graduate OS course.
- Students entered PhD program before Fall 2023 can still take the QE based on previous rules.
- To register QE, please use the new Qualify Exam registration form.

Qualifying Requirements by Track: The four courses on which a student's qualifying examination will be based must be chosen from the following track-specific lists and approved in writing by the student's Advisor and Track Chair.

Artificial Intelligence:

- CIS 5511 Programming Techniques
- CIS 5526 Machine Learning
- CIS 5603 Artificial Intelligence
- CIS 5515 Design and Analysis of Algorithms
- CIS 5543 Computer Vision
- CIS 5525 Neural Computation

Computer and Network Systems:

- CIS 5511 Programming Techniques
- CIS 5512 Operating Systems
- CIS 5515 Design and Analysis of Algorithms
- CIS 5617 Computer Networking and Communication
- CIS 5642 Computer Architecture
- CIS 5637 Network & Information Security

Information Systems:

- CIS 5511 Programming Techniques
- CIS 5512 Operating Systems

- CIS 5515 Design and Analysis of Algorithms
- CIS 5516 Principles of Data Management
- CIS 5526 Machine Learning
- CIS 5603 Artificial Intelligence
- CIS 5528 Predictive Modeling in Biomedicine

Software Systems:

- CIS 5511 Programming Techniques
- CIS 5512 Operating Systems
- CIS 5515 Design and Analysis of Algorithms
- CIS 5516 Principles of Data Management
- CIS 5617 Computer Networking and Communication
- CIS 5637 Network & Information Security

The exam may be retaken only once (either in full or in part), normally within one year of the first attempt, and only with the permission of the Graduate Committee. The Committee may, at its discretion, recommend a passing grade for a student conditional upon the satisfactory completion of a list of courses prescribed by the Committee for the purpose of remedying specific deficiencies. Failing this exam a second time means automatic dismissal from the program.

5. Ph.D. Preliminary Examinations

Doctoral Advisory Committee: Once students have passed the Qualifying Examination, they are expected, during that same semester, to choose the area in which they plan to do their research and to find an advisor willing to supervise them. The student and advisor should formulate a Plan of Study to complete the coursework requirements for the Ph.D. degree. The advisor and the student will then select at least two additional graduate faculty members for the Advisory Committee. The **Doctoral Advisory Committee** is formed to oversee the student's doctoral research and is comprised of at least three Graduate Faculty members. Two members, including the Chair, must be from the Department of Computer and Information Sciences. Committee compositions must be approved by the CIS Graduate Committee. The Chair is responsible for overseeing and guiding the student's progress, coordinating the responses of the committee members, and informing the student of her/his academic progress. The Advisory Committee administers the Preliminary Examinations.

Preliminary Examinations: The goal of the preliminary exams is to test the research skills and knowledge of the student and the appropriateness and feasibility of the proposed research. The exams are completed in two stages:

- Prelim I consists of written and oral components testing advanced track knowledge and in-depth knowledge of the research area and includes a literature review of the area. Prelim I will also be used to determine whether the student needs to take additional courses in order to support research in the chosen area. Prelim I is open only to the Doctoral Advisory Committee and members of the department. It is to be taken within one year of passing the Ph.D. Qualifying Examination. Students must be registered for at least 1 credit of CIS 9994 Preliminary Exam Preparation in the semester in which the examination is taken.
- Prelim II consists of written and oral components to assess the appropriateness of the research including the approach and methodology. It is designed to ensure that the selected research problem is of reasonable scope and significance and that the proposed dissertation is feasible. The written portion of Prelim II should be of sufficient quality to be publishable as a department technical report. This exam is open to the public. Students must be registered for at least 1 credit of CIS 9998 Predissertation Research in the semester in which the examination is taken.

The Doctoral Advisory Committee evaluates the preliminary examinations. Each member votes to pass or fail the student. In order to pass, a majority of the committee members must agree that the exam has been satisfactorily completed. The successful completion of the preliminary examinations produces a written understanding among the student, faculty advisor, and Doctoral Advisory Committee, specifying the work to be done to obtain final approval of the dissertation.

Students who are preparing to do their preliminary examinations should confirm a time and date with the Chair of their Doctoral Advisory Committee and register with the CIS Administrative Coordinator by submitting **Prelim I or Prelim II forms and a drafted announcement** (the announcement should include the student's name, the degree and exam type, the exam date/time and location, a title, a short abstract, Doctoral Advisory Committee members) **one month prior** to the date. To schedule an exam, students should contact the CIS Administrative Coordinator.

Students who have completed all coursework for the degree, but have not passed the Prelim I, must register each Fall and Spring semester for at least 1 credit of CIS 9994. Students must be registered for CIS 9994 in the semester in which the examination is taken, including the Summer session. A student who is required to retake the preliminary examination in whole or in part must re-register for 1 credit of CIS 9994 in the semester in which the examination is retaken. Students who have passed the Prelim I, but not the Prelim II must register each Fall and Spring for at least 1 credit of CIS 9998. Students must be registered for CIS 9998 in the semester in which the Prelim II examination is taken, including the Summer session.

Dissertation Proposal: After passing the Prelim II, students are admitted to PHD candidacy by submitting their dissertation proposal with the form of "[Dissertation Proposal Transmittal for Elevation to Candidacy](#)" within one month. The dissertation proposal demonstrates the student's knowledge of and ability to conduct the proposed research. The proposal should consist of:

1. the context and background surrounding a particular research problem;
2. an exhaustive survey and review of literature related to the problem; and
3. a detailed methodological plan for investigating the problem.

The proposal should be finished and approved no more than one year after completing coursework. Upon approval, a timeline for completing the investigation and writing process are established.

6. Dissertation Defense

After passing both parts of the Preliminary Exam and being admitted to PHD candidacy, students begin work on their dissertation under the direction of their Advisory Committee. Students must enroll for at least two credits of CIS 9999 Dissertation Research. Students must be registered for CIS 9999 in the semester in which they defend their doctoral dissertation.

Dissertation: The doctoral dissertation is an original empirical study that makes a significant contribution to the field of Computer and Information Science. It should expand the existing knowledge and demonstrate the student's knowledge of research methods and a mastery of her/his primary area of interest. Dissertations should be rigorously investigated; uphold the ethics and standards of the Computer and Information Science field; demonstrate an understanding of the relationship between the primary area of interest and the broader field of Computer and Information Science; and be prepared for publication in a professional journal. The dissertation should be prepared according to the requirements of the Graduate School. Please refer to the **Dissertation & Thesis Handbook** for further direction.

The **Dissertation Examining Committee** evaluates the student's dissertation and oral defense. This committee is comprised of the Doctoral Advisory Committee and at least one additional Graduate Faculty

member from outside the Department of Computer and Information Sciences. The chair of the committee must be from the Department of Computer and Information Sciences and **cannot be the advisor**. The Outside Examiner should be identified no later than the beginning of the term in which the student will defend the dissertation. If the External Member of the committee is not a Temple faculty member then a nomination of service form and a current CV must be submitted before serving on the committee. The committee evaluates the student's ability to express verbally her/his research question, methodological approach, primary findings, and implications. The committee votes to pass or fail the dissertation and the defense at the conclusion of the public presentation.

If a student needs to change a member of a committee, the new member must be approved by the CIS Graduate Committee and registered with the Administrative Coordinator and the Graduate School via “**Request for Change in Dissertation Committee**” form.

Students who are preparing to defend their dissertation should confirm a time and date with their Doctoral Advisory Committee and register with the Administrative Coordinator at least 30 days before the defense is to be scheduled. The student and Chair receive confirmation of the time, date, and room for the examination. The Administrative Coordinator sends the Graduate School a completed “**Announcement of Dissertation Defense**” form, found in TUportal under the Tools tab within “University Forms,” at least 10 days before the defense. The department posts flyers announcing the defense.

7. Graduation

Here are steps to Graduation in the Final Year/Semester:

- I. **Writing the dissertation.** The student must consult with their Advisor and Dissertation Examining Committee to discuss and agree upon the overall content and structure of the dissertation document. The thesis should begin with an introduction that introduces the background, purpose, and scope of the research. If the student has manuscripts that are submitted or published, then they may include those papers as chapters, reformatted following Temple guidelines as chapters. A final discussion/conclusion chapter is also expected to place the dissertation in context. The guidelines for formatting and submitting the thesis are given in the **Dissertation & Thesis Handbook** (<https://grad.temple.edu/resources/dissertation-thesis-handbook>)
- II. **Course registration.** Students must be registered for one credit of CIS 9999 in the semester they present their final defense. If the defense will occur in the summer, the student must be registered for CIS 9999, preferably the 12-week course so they don't get boxed into one or the other summer session.
- III. **Apply for graduation.** Apply for graduation via TUportal during the same semester as the upcoming dissertation defense.
- IV. **Scheduling the defense.**
 1. A defense should not be scheduled until the student and all Dissertation Examining Committee members are in agreement that it is appropriate to do so.
 2. Scheduling a date, time, and location for the defense should be done several weeks prior to the defense to allow for necessary paperwork and to allow for Committee members and other interested parties the opportunity to adjust their schedules.
 3. A room must be reserved (including proper planning for accessibility, recording, remote access, and A/V equipment) following procedures by the CIS Department. This room should be reserved for at least two hours.
 4. The student must submit to their Dissertation Examining Committee a full draft of the thesis at least 3 weeks prior to the defense.

5. At least 30 days prior to defense the student must complete and submit the “Announcement of Dissertation Defense” form with a drafted announcement (the announcement should include the student’s name, the degree, the defense date/time and location, a title, a short abstract, Dissertation Examining Committee members and their affiliations).
 6. The announcement will be emailed to all CIS faculty and students.
- V. **Conducting the defense.**
1. The defense includes a public phase during which the student presents their work. This should last 45 minutes to one hour. During and following the public presentation, the student will take and respond to questions. Dissertation Examining Committee members will refrain from asking questions during the public phase. The Chair will set the tone for the defense. The Advisor is welcome to say a few words and introduce the PhD student.
 2. Immediately following the public presentation, the student will meet with the entire Dissertation Examining Committee in a closed session.
 3. During this time the Committee may ask questions and discuss possible changes to the thesis. After this part of the examination, the student leaves the meeting, and the Dissertation Examining Committee carries out its final evaluation. The committee must decide whether the student has successfully defended the thesis and what specific changes/edits must be made to the thesis.
 4. Following the Dissertation Examination, the committee will complete and submit the “Final Examination Report for Doctoral Candidates” form.
- VI. **Submitting the thesis.** If the student passes, then they will complete their final edits to the thesis and submit it through Temple’s ETD site (<https://www.etsadmin.com/temple>) before the **semester deadline** (stated in the handbook). The final preparation of the thesis must follow the dissertation handbook (<https://grad.temple.edu/resources/dissertation-thesis-handbook>). This includes correct completion of the official “signature page” as outlined in the handbook.
- VII. **Conferring of degree.** Once a student has successfully defended their dissertation, and the “Final Examination Report for Doctoral Candidates” form has been submitted, and the thesis has been submitted, the University can officially award the degree.

8. Other Requirements and Policies

In general, students must satisfy the requirements of the CIS Department, the College of Science and Technology, and the Graduate School. These currently include the following:

- Students must register EVERY SEMESTER and must complete the program within seven years from the date of admission, unless permission is given by the Dean of the Graduate School (which includes completing and the approval of a “Leave of Absence” process)
- Students can take one credit of CIS 999X to fulfill the full-time requirement if they have completed all coursework requirement (30 credits = 24 credits of track-specific courses + 6 credits of other graduate courses, CIS 999X does not count)
- Students must have a 3.0 (or “B”) average and no incomplete courses at the time of graduation;
- Students may not receive more than two grades of less than “B-”.
- Students may not receive more than one grade of a “F.”

PhD FAQ:

More FAQ can be found at https://cis.cst.temple.edu/academics/graduate/phd_faq/

Can I take courses from other disciplines?

There is no limit on the number of credits earned from other Temple departments. However, such courses must be approved by the Graduate Program Committee in consultation with the student's Advisory Committee.

Can I transfer to one of the MS degree programs?

All CIS graduate students accepted into the Ph.D. program are expected to successfully complete the program. Transfer to one of the MS degree programs is not permitted except under extraordinary circumstances.

When can I apply for a Dissertation Completion Grant?

Students who no longer are receiving support from the University and who are official Ph.D. candidates [having passed Prelim II and been elevated to candidates by the Graduate School] can apply for a one-time Dissertation Completion Grant. Students receiving such awards are not allowed to receive University funding again.