COMPUTER SCIENCE DEPARTMENT

PHD ADVISING MANUAL

(Last updated February 6, 2023)

OVERVIEW

Our Ph.D. program takes about 5-6 years to complete, but the duration varies depending on the student and the advisor. Here is a high-level timetable of the requirements:

Year 1	WSE Academic Ethics online course Title IX online training module
Years 1 - 3 ("qualifying requirements")	Eight courses Two Research projects Responsible Conduct of Research
Years 3 - 4	Graduate Board Oral Exam (GBO) First meeting with thesis committee Finish Research Projects
Years 4 – (n-1)	Annual meetings with thesis committee Research
Year n	Departmental seminar Thesis defense Submit final dissertation to library

These requirements are discussed below. The timetable is designed to help you keep moving along toward the Ph.D., it is not a strict requirement to finish the items by the listed timeframe.

Note that the Ph.D. qualifying requirements are a slightly stricter version of the M.S.E. requirements. Once you complete the coursework requirements and your first qualifying project, you may be entitled to an M.S.E. degree from JHU (upon request). If you are receiving the standard departmental stipend - or have an externally funded stipend at or below the level of the level of an internal, departmental stipend – once you have completed your coursework, both qualifying projects, and your GBO requirements, you will become a dissertation student and will be entitled to a $100 per month raise.

If you transfer into the Ph.D. program from our master's program, then to align with the timetable you can approximately assume you are starting out as a second-year PhD student – the 1.5 - 2 years of an M.S.E. roughly approximates one year of a PhD.

Important People

As a Ph.D. student, you will get to know many of the faculty. However, you will have special relationships with the following people:

Your Advisor

Your advisor's job is to help you become a successful member of the academic community. He or she will guide your course selections and your research, give you career advice, and tell you when you are ready to defend your thesis. Learn more about mentoring expectations of faculty advisors and PhD students at Johns Hopkins University here. A faculty advisor will be assigned to you when you are accepted into the Ph.D. program. Most students keep their advisors until they graduate, but you may change advisors at any time.

Any consenting JHU CS professor may serve as your advisor, including those with secondary, joint, or Research Professor appointment in the Department of Computer Science. By the end of your first year, you must have an assigned research advisor in order to remain in good standing. If a student is in danger of falling out of good standing, the department may place that student on probation. Here's where you can learn more about the Homewood Schools Policy for Graduate Student Probation, Funding Withdrawal, and Dismissal.

Your Thesis Committee

Your thesis committee's main job is to decide when to accept your Ph.D. thesis. Obviously, it's wise to keep them informed and seek their counsel while you are researching and writing the thesis. You will probably also approach them for letters of recommendation as you are finishing.

You should aim to choose your thesis committee by the end of the third year, and plan to meet with them annually. The committee is chosen in consultation with your advisor and must include:

- Your advisor;
- Another member of the JHU CS faculty, who must have a primary, tenure-track appointment in the JHU CS department if your advisor does not;
- One or more other committee members with Ph.D. degrees. You are strongly encouraged to include someone from outside the department or university, to get the benefit of an outside perspective and to increase your work's visibility.

Your GBO Committee

Your sitting committee will consist of 2 inside and 2 outside faculty examiners plus one additional examiner. Inside examiners are primary CS faculty; outside examiners are usually primary faculty in another JHU department. More details can be found below in the *GBO Examination section*.

The Graduate Academic Program Administrator

The Graduate Academic Program Administrator, currently Kim Franklin, sits in Malone 160 and can help you with most administrative and financial matters. You can also reach out to Meagan Wade, Sr. Academic Coordinator for the PhD and MSE program if you need further assistance.

The Director of Graduate Studies

The Director of Graduate Studies (DGS), currently Professor Scott Smith, oversees the CS graduate program and CS graduate student life generally. If you feel you need to talk to someone outside your committee, confidentially or

otherwise, try the DGS (or the Department Head). The Director of Graduate Studies also welcomes more general questions, comments, and concerns.

The WSE Associate Dean of Graduate Academic Affairs

The current Associate Dean is Christine Kavanagh. She is a great resource for any academic or student life questions/concerns that you'd rather not, at least initially, ask the department.

Coursework

Coursework will help you educate yourself in your research area and in CS more broadly. You may enroll in courses as long as you are here, including courses in other departments. Select courses are offered during the summer.

Students should aim to take 8 graduate courses within their first two years. Students who began the program in the Fall 2022 or later must follow the current Coursework Advising Worksheet, which stipulates that more than half of all courses (at least 5 out of 8) must be taught in the Department of Computer Science. Of those courses, 4 out of the 5 core distribution areas must be satisfied. Distribution areas include **Theory, Applications, Systems, Software and Reasoning**. The remaining courses may be faculty advisor-approved electives inside or outside of the Computer Science Department. When coursework requirements are complete, students must submit the appropriate coursework advising worksheet (signed by their advisor) to the Department's Academic Program Administrator.

Students who were admitted to the program prior to the fall of 2019 may choose to use the current coursework requirements, or fulfill coursework requirements using the guidelines set forth in the pre-2019 Coursework Advising Worksheet. This included at least 6 core CS courses -- 2 each from the Analysis, Applications, and Systems areas, and 2 electives.

Some students prefer to get this requirement out of the way in the first year. However, 4 graduate courses per semester leaves little time for research and teaching. Your decision will depend on your funding situation, your personal preference, and your advisor's recommendation.

Every semester your advisor must approve your course registration, and every semester you must register for approximately 15-20 credits of "PhD Research" (601.809-810). This is in addition to any other courses you are taking, and applies to you even if you've completed all of your coursework requirements. The Registrar caps the credit limit at 25 credits each semester. PhD students should register for at least 20-credits every semester, so you'll want to adjust the variable credit amount for your PhD Research section depending on your full course load.

Every semester, all students must attend a fair number of Computer Science Seminars. SIS enrollment in the "Computer Science Seminar" (601.801-802) course is required for first and second year students only.

How do I know if a CS course can be used as one of the 8 graduate courses? The eligible CS courses are generally those courses numbered xxx.600 and above. The rarely used "Independent Study" (601.805-806) may be taken for graduate credit and a letter grade, under a faculty member's supervision. Courses do not count unless they are taken for a grade; thus you cannot count pass/fail seminars or the required department seminar series (601.801-802). Also, courses are ordinarily 3 credits; a 1-credit course counts as only 1/3 of a course and three such courses can serve to count for one full course. *Effective Fall 2017, only courses that are 600-level and above are eligible to be put toward the CS coursework requirements, except for documented and approved exceptions. This is a WSE-wide initiative and will not impact courses taken prior to the Fall 2017 semester.*

How do I know if a non-CS course can be used as one of the 8 graduate courses? Any graduate course offered by a full-time JHU program is eligible with advisor approval. Your advisor must agree that the course is relevant to your degree -- either to computer science generally, or to your specific program of study and research. Graduate level courses in most departments are those numbered 600 and above.

How do I know if a course can be used as one of the 5 core CS distribution areas? The official designator list is on the CS website. For CS courses, the designations are also given in the course catalog.

Do I have to do well in the courses? You need at least a C- for a course to count, and your average grade for the 8 courses must be at least B+. What you learn will also help you in your GBO Exam, your research, and your future career. But ultimately, the world will judge you on your research, not your grades.

Can I fulfill any of these requirements using graduate courses taken elsewhere? Yes, if the courses have not been counted toward an undergraduate degree or taken as an undergraduate in another institution. They must be of comparable rigor and appropriate for the requirements in question, as attested by a syllabus, problem sets, or other course materials. You may apply up to 2 appropriate non-JHU courses toward the course requirements, with advisor approval. If you are willing to forego JHU's MSE degree (typically because you already earned a master's elsewhere), then you may apply more than 2 appropriate non-JHU courses toward the Ph.D. requirements, with the approval of the Director of Graduate Studies; this may include up to 4 appropriate courses from JHU's EP programs.

Responsible Conduct of Research Course

Before you begin your second year, you must take the in-person mini-course AS.360.625 Responsible Conduct of Research. This is under 10 hours and is offered during the summer, fall, intersession, and spring sessions. Failure to comply with this requirement by the end of the first year of enrollment may result in the inability to conduct research and receive the associated stipend/salary.

Academic Ethics

This mandatory module and quiz is embedded in the WSE online orientation and part of every graduate student's degree requirements. You will see the course EN.500.603 added to your SIS enrollment. Do not drop this course!

Qualifying Projects

The Ph.D. degree is primarily a research degree, of which coursework is merely the foundation. Our program quickly gets you involved in research projects. Here are the official project requirements:

A student must complete two qualifying projects as a requirement for the PhD. One project must be under the supervision of a faculty member with an appointment in the Department of Computer Science (Professor, Research Professor, Visiting or Joint appointment). The second project can be supervised by a different tenure-track or research faculty member in any division of Johns Hopkins, or with advance approval from the department, by any outside researcher.

Before starting a project, students must submit a Qualifying Project Agreement Form to the Academic Program Administrator. This form can be found here. If the project supervisor needs approval (i.e. they lack an appropriate appointment at Hopkins), a copy of their CV must also be included with the form and work on the project should not commence until the department has approved the outside supervisor. Note: all project supervisors must have a doctoral degree.

Upon conclusion of each project, the student must write a Project Report describing the project in detail. The supervisor or student will forward the final version of the report, along with the signed Qualifying Project Coversheet found here, to the Academic Program Administrator. These reports are archived and are available for members of the department to browse on request.

The project requirement can give you a chance to try out two prospective advisors/areas. If you have already settled on an advisor, then the second project can be a way to develop skills in a related area of computer science, or to experience the perspectives and working style of a different advisor.

The advisor's signature attests that the student has taken a well-defined piece of work from conception through execution to write-up, and understands what is involved in producing a complete unit of scholarship in this area. This may be a relatively small unit of scholarship for purposes of the departmental requirement, although sometimes the student and the project advisor may agree to target a larger unit in order to make the collaboration worth undertaking.

Note that faculty members may have varying ideas about the appropriate topic, scope and duration of a project, so you should discuss this at the start to reach agreement. The required Qualifying Project Agreement Form you must submit upon starting a project is an informal contract of agreement on the scope of the project. Research projects often evolve over time, but any significant changes to the completion criteria should be mutually agreed on. Note that an acceptable outcome is a report clearly showing that the original idea, when diligently pursued, turned out not to work.

It is your job to find faculty members who are willing to supervise you on projects of mutual interest. Often you will take someone's graduate course before trying to do research with him or her. The idea for a project may come from you or from the faculty member. Multi-advisor projects are encouraged, as are inter-disciplinary projects, but they must be signed off by the (sole) project advisor as satisfying the CS qualifying project requirement.

If a qualifying project builds on a course project, the work done for course credit should not be double-counted. A project may be abandoned if it is not working out; notify the academic program administrator if this is the case.

THE GBO EXAMINATION

You will face a committee of 5 professors who will evaluate your readiness to do Ph.D. research. This Graduate Board Oral Examination (GBO) is a University examination, required of all doctoral students at JHU. (The Graduate Board is the committee that oversees all graduate programs at Hopkins). You should aim to complete the GBO requirement by the end of your third year.

GBO PRELIMINARY RESEARCH PROPOSAL

In our department's tradition, the center of the GBO exam is a Preliminary Research Proposal that you write and present. This does not have to be a fully developed thesis proposal (although it could be, if you have progressed quickly). It should at least motivate some interesting research problem in the context of previous work, and sketch your possible approaches to solving it. Preliminary results are helpful but are not required.

Writing the proposal should be useful for you, and it will typically develop into the thesis topic. However, it is not a commitment to a topic. Its purpose is simply to focus the GBO exam. You must distribute it to all GBO examiners at least 2 weeks before the GBO. Eight to ten pages are sufficient.

GBO Format

The GBO is a closed-door exam two hours in length. You will begin by presenting your Preliminary Research Proposal, and then the examiners are free to ask any questions they want. The department prefers that examiners focus on your readiness to do original research in the area of the Preliminary Research Proposal. We hope that their questions will focus on the technical substance of the proposal, your ability to discuss the broad area with clarity, flexibility and maturity, and your knowledge of subjects that are likely to come into your work. However, the examiners are not bound by our requests and may assess you in any way they choose. You are therefore advised to discuss expectations with them before the exam, if they are willing. Further GBO policies and guidelines can be found here.

GBO Examiners

The sitting GBO committee will consist of 5 examiners. You may select 2 from inside the department and 2 from outside the department, plus a 5th member either inside or outside the department. You must also name 1 additional inside alternate and 1 additional outside alternate in the unlikely event of a last-minute cancellation. Your advisor always counts as an inside examiner and so do all faculty with primary appointments in Computer Science, including BDPs. Faculty holding primary appointments outside of Computer Science who have a Computer Science affiliation are considered outside examiners. Outside examiners are intended to contribute valuable perspectives and also ensure that the department doesn't let its standards slip. At least one of the outside examiners must be an Associate, Full, or Emeritus Professor at JHU, and there must be another such-ranked outside Professor proposed to sit on the Committee or as an Alternate; the most senior outside examiner will serve as committee chair and an alternate for that role is also required. You may contact your faculty examiners prior to your GBO to inquire about their expectations. Please keep in mind that an examiner is not required to discuss expectations – if they choose to do so, it is as a courtesy to you.

Most commonly, examiners are tenure-track JHU faculty. However, the Graduate Board can approve scholars from outside JHU, or research faculty at JHU. The department must petition the Graduate Board 4 weeks in advance to authorize such persons, see below for details on this process.

GBO Outcomes

Possible exam outcomes are on the graduate board website. The most common ones are unconditional pass and conditional pass. In a conditional pass, the committee will require you to remedy some weakness in your preparation, e.g., by earning an A- or better in a particular course.

Scheduling the GBO

It is the department's job to schedule your GBO. At least a month before you are to take the GBO, you or your advisor should inform the CS Graduate Academic Program Administrator. The hardest part of the GBO is finding an appropriate committee of 5 faculty examiners plus 2 alternates who are all free at the same time as you are. Fortunately, this is not your responsibility. It is handled by the department (i.e., The Academic Program Administrator together with the Director of Graduate Studies, Prof. Smith).

The Academic Program Administrator will suggest that you and your advisor give him/her the names of appropriate potential examiners; In particular, you and your advisor should predict who will be on your thesis committee so that those faculty can be included on your GBO committee if possible. It is helpful if you approach your chosen committee members in advance to remind them of who you are, and inquire if they are generally available and willing to serve as a GBO committee member. Further GBO guidance can be found here.

In consultation with your advisor, you should send the Academic Program Administrator:

- The name, rank, department affiliation and email address of 7 potential GBO committee members. Please indicate which 2 potential committee members (1 inside and 1 outside) you wish to designate as alternates in case someone cancels or doesn't show up.
- Depending on how you wish to shape your committee (see heading GBO Examiners above for more detail), 3-4 of those potential members should be inside. Again, your advisor will serve as an inside member regardless of their primary department affiliation.
- Depending on how you wish to shape your committee, 3-4 of those potential members should be outside members. At least 2 of the potential outside members must be Associate, Full, or Emeritus Professors, so that someone can serve as chair and you have a back-up chair if needed. The GBO Chair is appointed by the Graduate Board and is typically the most senior outside Associate Professor or above.
- If any of the above is not a tenure-track JHU faculty member, then your advisor should also send the Academic Program Administrator (1) that person's full CV, (2) a one-page summary of your research, and (3) an explanation of why that person's expertise is needed at your GBO or on your thesis committee. The department will combine these into a letter petitioning the Graduate Board for approval. Note that approval takes 4 weeks. Of course, this is unnecessary if the examiner is already approved; special authorization to serve on a GBO committee lasts for 5 years.

The Academic Program Administrator will ask for your and your advisor's availability so that he or she can begin scheduling the exam. The department will then nominate a panel. The Academic Program Administrator will complete a form and send it to the Graduate Board for its approval, three weeks before the exam.

Once the exam is scheduled, The Academic Program Administrator will tell you who the examiners are so that you can send them your Preliminary Research Proposal at least two weeks in advance.

DEPARTMENTAL SEMINAR

Sometime between your GBO and thesis defense, you must present your thesis work to the department in a one-hour talk. This is primarily for the department's benefit – everyone deserves to find out what you've been working on all those years. Some students use this requirement as a way to practice their job talk. Others use it as the first hour of their thesis defense. WSE policies can be found here.

THESIS, DEFENSE, REVISION

The Ph.D. thesis, or dissertation, is the signal achievement of the Ph.D. degree. It is a large, careful, and substantive piece of original work. Most computer science dissertations are 150-200 pages long, with hundreds of bibliographic references, and systematically investigate a set of ideas.

Your dissertation is presumably not the last piece of research you will ever publish, or even the most important. However, it may be one of the largest. Writing this document is a satisfying way to wrap up your graduate experience, but is itself a considerable creative act requiring plenty of time. You'll want to synthesize and explain several years of work (a process that may lead to new insights), and fill in the gaps. By year 3, you should've begun to assemble your thesis committee. By year 4, you should be having annual meetings w/ your thesis committee and you should be engaging in dissertation research.

Your advisor will help you decide when your thesis is essentially finished and ready to defend. You must give the thesis to your committee members at least 2 weeks before your scheduled defense date (and preferably earlier), so that they have time to read it carefully. Your defense date must also be publicly announced to the department.

The thesis defense is a public event, usually consisting of a 1-hour talk followed by questions from the committee and other audience members. Following the defense, the committee will decide what changes are required before they will sign off on the thesis.

Thesis committees almost always ask for changes, ranging from expository improvements to substantial further research. You can reduce this workload somewhat by consulting your committee frequently before the defense. But even so, you should plan for a month or more of hard work after the defense.

Unlike the GBO, you are responsible for scheduling your Defense. Once you and your committee finalize scheduling details, please provide the following to the Academic Program Administrator: (1) Date and Time, (2) Thesis title and abstract, (3) link to your research or thesis website, (4) professional plans after Hopkins, (5) a brief biography, (6) a high-resolution photo as an attachment and (7) your Zoom link, ID and password (if applicable). Should your defense be remote, please be sure to use a WSE Zoom account so that your time and participants aren't limited. More details on WSE Zoom accounts here.

Your dissertation will be submitted to the JHU library for electronic publication and must follow certain formatting guidelines. Do not submit your dissertation to the library until your advisor has provided a Reader's Letter to the Academic Program Administrator, documenting final approval. The Department will cover your ETD submission fee. You should contact the Academic Program Administrator to make arrangements.

Time management can be tricky in the final year of the Ph.D. You may be applying and interviewing for jobs as you try to finish the research and write the thesis. And everything will take longer than you expect. So make sure to leave lots of slack in your schedule. International students should be in touch with OIS at least one month prior to their defense in order to start the OPT approval process. All students should report their intended last day on payroll to the Academic Program Administrator with at least 3 weeks notice.

FUNDING

As long as you remain in full-time student status, you will be given full support – in the form of either a Research Assistantship (RA) or a Teaching Assistantship (TA) – for the duration of your CS PhD career. It is a CS PhD program requirement that full-time, resident PhD students are funded on either a Research Assistantship, Teaching Assistantship, or Fellowship during an academic semester (fall/spring). Exceptions to this requirement may be granted on a case-by-case basis. Full support includes:

- Full tuition coverage – funded by both the JHU Dean's Office and the CS Department (for TAs) or the faculty advisor (for RAs).
- Health insurance coverage – funded by the Department or your faculty advisor.
- A monthly living-stipend provided during the fall and spring academic semesters (9-months), and possibly for the summer (12-months) i.e. June, July, August should you continue working with your advisor and remain researching as a full-time student with the University (as opposed to doing an external internship or study away program.)

Performance and Probation

No matter how brilliant your research is, the department can't give you TA funding if you don't fulfill the degree requirement to teach, and your advisor can't legally give you RA funding from a federal grant unless a reasonable amount of your work is related to the grant topic. Please be sure you have reviewed the Homewood Schools Policy for Graduate Student Probation, Funding Withdrawal, and Dismissal. If you are placed on probation and subsequently fail to fulfill the corrective measures outlined in your official probation letter, your program standing could be affected.

Aside from TA-ship or RA-ship, here are some other ways to earn money:

- You may be able to win your own funding from some sort of fellowship. For example, if you are a U.S. citizen and have completed less than 12 months of full- time graduate study, you can apply for an NSF Graduate Research Fellowship.
- If you can find a summer job doing CS research in industry, that can be good experience and pay well. (Although it might interrupt your progress toward graduation.) Of course, you cannot receive summer RA funding if you are also working a full-time job elsewhere.
- The department hires course assistants (CAs) at an hourly rate. This could be a good way to make some money if you were not otherwise funded.

In general, you should discuss your plans with your advisor.

Teaching Experience

Whether or not your career involves teaching your own classes, it will certainly involve explaining technical ideas in person and in writing. It takes practice to do this clearly and engagingly, and to tailor your presentation to your audience. The experience you gain by serving as a TA is invaluable. For this reason, the department has instituted a requirement that as of Fall 2015, all PhD students are required to serve as a Teaching Assistant at least one semester during their program of study.

As part of the requirement the instructor must give you an opportunity to be in front of a group of students at least once during the course (hopefully more). You will be required to **sign up for the course 601.807 (Teaching Practicum)** during the semester of your required TA-ship and at the end your performance will be evaluated by the course instructor.

The department also strongly encourages Ph.D. students to design and teach their own short courses, or to teach their own section of a core course. A short course is a 1-credit course that meets either during intersession (January) or a regular semester for a total of 12 class hours. Teaching a core course section provides the opportunity to collaborate on course content, assignments, etc., with other section instructors, including at least one regular faculty member, while being fully responsible for a regular semester-long course. Both of these types of teaching activity are compensated accordingly.

PhD Progress Reviews

At the end of each academic year, the CS department reviews the progress of all its PhD students. The goal of this process is to step back once a year and reflect on your progress in the PhD program. Part of the purpose of the review is making sure various requirements are getting checked off, but it also serves as an annual check-in on the less tangible aspects of progress toward your PhD, including what is going well and what could be improved on.

The first step in the annual evaluation is a written self-review, an opportunity for you to reflect on your own progress and to share your thoughts in writing with your advisor. Your advisor as well as possibly other faculty will then meet with you in person to discuss your self-review and your progress. Finally, you will receive a written letter from your advisor and the department summarizing your overall progress in the previous academic year.

INTERNSHIPS

SUMMER MONTHS

Students are encouraged to pursue full-time internship opportunities during the summer months (roughly June 1 – August 31). International students must apply for and be approved for full-time CPT if their internship is located in the United States.

ACADEMIC SEMESTER

During an academic semester, students may do a part-time internship (working up to 19.99 hours per week; international students must apply for part-time CPT), but should seek the approval of their CS research advisor before doing so. Should a student, with the approval of their CS research advisor, pursue a full-time internship during an academic semester, they MUST apply for a change in student status from full-time residential to non-resident status. Final approval of this status change must come from the Dean. International students will need OIS approval for full-time CPT, which will only be approved if the internship directly correlates with their dissertation. The WSE non-resident application can be found here. During non-resident status students are responsible for non-resident tuition (10% of full tuition) and health insurance costs unless their advisor volunteers to cover them. During non-resident status, students don't receive their PhD stipend.

Students must notify the Academic Program Administrator a minimum of 3 weeks prior to their internship start date in order to adjust payroll and prevent overpayment. They must also notify the Academic Program Administrator of their internship end date as soon as it is known to prompt a return to payroll.

ONLINE RESOURCES

CS PhD students are beholden to the JHU WSE academic policies listed below, unless the CS Department has a differing internal policy stated. Please contact either the Academic Program Administrator or the Director of Graduate Studies if you need clarification regarding if and/or how a policy may apply to you.

- Graduate Academic Catalog Policies
- Graduate Board Academic Policies
- General Graduate Student Policies
- Policy on Mentoring Commitments for PhD Students and Faculty Advisors
- Policy on Annual Academic & Professional Development Discussions for PhD Students and Faculty Advisors
    - Annual Discussion and Planning Form
- Graduation Guide Deadlines
- Computer Science PhD Forms