TOYOTA TECHNOLOGICAL INSTITUTE AT CHICAGO

ACADEMIC PROGRAM GUIDE

2023-24

Contents

Institute Mission

Achieving international impact through world-class research and education
In fundamental computer science and information technology.

This overall mission has two components --- a research mission and an education mission.

The Research Mission

TTIC aims to achieve international impact through world-class research in fundamental computer science and information technology. Here we clarify the intended meaning of the terms in this statement.

Impact. The mission statement focuses on academic impact. Several criteria may serve to evaluate such impact. These include volume of peer-reviewed publications; reputation of venues in which publications appear; visibility of work in the community, as expressed in citations by others; number and reputation of co-authors, in particular in other institutions; recognition by research community, including awards, prizes, invited talks, and invitation or election to serve in senior service positions in professional organizations; reports by external advisory bodies comprised of reputable senior researchers, etc. Precise objective measures of academic impact are controversial and elusive, and no one of the criteria above is alone a solid measure in itself. However, the combined evaluation of these and similar criteria helps assess the academic impact achieved by TTIC researchers.

Note, that the number of patents filed, or the amount of extramural research funding, are not considered measures of academic impact. Although funding is clearly an important tool in achieving impact, it is only a tool and not an end in itself.

Fundamental. The mission statement is intended to focus on scientifically fundamental research. A scientific result is fundamental to the extent that it has open-ended implications. It is important to distinguish being fundamental from being economically important. A calendar program can be economically successful, and hence important, without adding to fundamental knowledge. The concept of NP-completeness adds greatly to the fundamental understanding of computation without having clear economic significance.

Computer Science and Information Technology. Computer science and information technology encompasses many sub-disciplines. In the selection of sub-disciplines for study at TTIC there should be some consideration of relevance to society as a whole. The interpretation of "computer science" and "information technology" should be such that TTIC remains relevant to the societal impact of computation and information.

The Education Mission

The education mission of TTIC is to achieve international impact through the accomplishments of its graduates as productive scientists and citizens. The notion of "impact" in the education mission is broader than in the research mission. The graduates of TTIC might achieve impact by starting successful companies, managing successful products, or influencing government directions in research funding. Of course, TTIC also strives to produce Ph.Ds. who achieve academic impact throughout their careers. The institute strives to produce graduates who contribute to society through their intellectual leadership in computer science and information technology. Success in the education mission requires appropriate selection of curriculum, effective teaching to enable learning, effective assessment and mentorship of students, and effective marketing of students in the job market. TTIC strives to place its Ph.D. graduates at high-quality research institutions. TTIC also strives to make its Ph.D. students visible to the academic community before graduation. This can be done most effectively through publications prior to graduation.

Diversity, Inclusion and Equity

TTIC is committed to effective and compliant policies that foster and expand a supportive and inclusive environment to encourage success for students, staff, and faculty. The institute should exploit the intellectual abilities and talents of all segments of society. TTIC's collective success in its research and education missions depends on the robust exchange of ideas, as well as on collaboration, innovation, creativity, and broad participation. This requires a dedication to promoting diversity, equity and inclusion in its faculty, staff, student body, and educational programs.

Vision and Values

The 21st century will see enormous progress in automation. Automated systems may drive cars, do housekeeping, and translate between spoken languages. But technological progress raises social concerns. Technology must not extinguish our right to privacy, make people unemployable, or destroy cultural diversity. While technology presents important challenges, it also holds great promise. Language translation can reduce misunderstanding. Information management can improve medical care. Communication systems can bring people together. If we can reap the benefits while avoiding the pitfalls, technology may create and sustain harmony and prosperity for mankind. TTIC's vision is to discover and explore fundamental principles of computation and to improve our world through the technologies those principles enable. At the same time, TTIC is committed to the values of human freedom, dignity, prosperity, and diversity. The institute's mission and its work have been formulated and are carried out consistent with this vision and these values.

People

The strength of TTIC lies in its people. Whether directly involved in research and education, such as faculty and students, or providing the infrastructure and support needed for these activities to take place, all of our people are important to the success of TTIC's mission. TTIC acknowledges the value provided by each member of its community and aims to provide all its members with the tools and support they need to do their part in advancing the institute's mission.

Introduction to the Program

The PhD Program at the Toyota Technological Institute at Chicago leads to a doctorate in computer science, and focuses primarily on:

- · Machine Learning and Optimization
- · Algorithms and Complexity
- · Computer Vision and Computational Photography
- · Speech and Language Technologies
- · Computational Biology
- · Robotics

TTIC is proud of its PhD Program, designed to prepare students for academic or research careers. To complete the PhD Program a student must make an original and significant contribution to the field of computer science and this contribution must be described in a PhD Thesis. In addition to the PhD Thesis, there are course and examination requirements for the completion of the Program. These requirements are described in this Academic Program Guide.

Students should keep in mind that these formal requirements are actually only a part of obtaining a PhD degree. The main component of a PhD program is the intangible process by which the student learns to do research and become a part of the academic community. Progress in the program will be assessed by a student's progress in research as well as their progress in satisfying the formal requirements.

Academic Calendar

2023 AUTUMN QUARTER	
Registration	Monday, September 18
Quarter Begins	Tuesday, September 26
Thanksgiving Break	November 20-24
Quarter Ends	Friday, December 8

2024 WINTER QUARTER	
Quarter Begins	Wednesday, January 3
Martin Luther King, Jr. Day	Third Monday in January
Quarter Ends	Friday, March 8

2024 SPRING QUARTER	
Quarter Begins	Monday, March 18
Memorial Day	Last Monday in May
Quarter Ends	Friday, May 24

2024 SUMMER QUARTER	
Quarter begins	Monday, June 10
Juneteenth	Wednesday, June 19
Independence Day	Thursday, July 04
Quarter Ends	Friday, August 16

Academic calendar dates for 2023-24 are subject to change based on public health regulations. The institute will notify students of any changes.

Financial Support

All PhD students receive a financial support package that is communicated to them at time of admissions in the admissions letter from the institute. The amount of support, duration, and expectations that the student maintains full-time enrollment and good academic standing in the program are described in the letter.

An overview of student funding, tax and payment policies are in the Student Handbook, with full details and policies on the TTIC Intranet under 'Student Policies.'

Current tuition, fees and charges are listed on the TTIC Intranet.

PhD: Expectations and Mindset

A PhD is often a very different experience compared to an undergraduate or masters program. What one gets out of a PhD can depend significantly on the mindset with which one approaches it. Here are a few suggestions for what to expect, and how to navigate a PhD program.

Fulfillment and fun You are learning how to be an effective researcher in some intellectual area, including by advancing that area through your own efforts. It is very important that you find fulfillment in your efforts, your area of endeavor, and in your interactions with others in the area. Ideally, this should also be fun. Your PhD training is a first step in a lifetime path. You may change directions over the arc of your life, but the one you are following now should be one you enjoy now and one that you see a future in.

Self-motivation It is helpful to think about what motivates you to work on something. Unlike undergraduate school or a master's program, PhD-level study involves long periods in which the primary driver is the student themself. It's also common for research to encounter unforeseen issues, and sometimes a research project does not pan out, or you get scooped. It is important to seek out sources both within and around you, which can help keep your motivation levels up during difficult times.

It is not uncommon for levels of motivation and drive to rise and ebb at different times during the PhD program. If you find yourself feeling discouraged or "stuck" in your research progress, please consider talking to your peers and discussing this with your advisor.

Initiative You can expect to take more initiative in research as you progress through the program. By the thesis proposal, and ideally well before, you should feel comfortable suggesting research directions, disagreeing with literature and your advisor, participating in others' projects, and running your own projects. It is common at the beginning of PhD for the research agenda to be driven/led by the advisor, while towards the end of the PhD, students typically take more initiative in initiating and leading the projects.

Reading Research often involves reading research papers that are relevant to your field. In some areas this might also involve reading through code. You need to develop something deeper than a textbook-level understanding of computer science and your field. Sometimes it is obvious where to start (your advisor might give you a reading list or you might take a graduate course with a reading list), but sometimes you may have to ask. Forward and backward chaining, where you follow citations made in a paper of interest, and citations of that paper, is also a good way to find an intellectual stream.

Writing and presenting No matter how good your research is, it's seen through the filter of your writing and presentation skills. You are also seen through that filter. These are not easy skills

to master, but it is well worth making the effort to do so. It is also important to understand that the expectations of your research community about what constitutes a good paper or a good talk may be very different from what you learned in a basic 'communication studies' course. A good way to learn is to read lots of papers and watch lots of talks in your area, and then ask yourself and your advisor about whether they were good, and why.

If you are interested in the academic job market (as well as various kinds of research labs), you should really pay attention to job talks given in the department, even if they are unrelated to your area. At TTIC, you get a chance to see people who have successfully gotten an interview, and you get to see a job talk through the spring recruitment seasons. You can discuss with your advisor and others about what constitutes a successful talk or interview .

Networking Knowing people in your area is important. You should seek out opportunities to meet people in professional settings such as conferences, invited talks here, and other venues. You can ask your advisor or other faculty to introduce you. Think beyond just the conferences where you might be going because you have an accepted paper. If there is a relevant conference or workshop you might like to attend, ask your advisor if you should go. TTIC has funds that can be used for travel to remote conferences (see the Student Funding Policy for details). If you can participate in a student meeting with a visitor, this can also be a great way to network.

Broadening what and who you know While earning a PhD involves becoming an expert (hopefully *the* expert) on a very specific question or topic, academic growth often results from being able to apply the skills and mindset you have learned on other topics. It is also the case that having a broad view of computer science (or even science/engineering in general) makes it possible for you to find and exploit novel connections. It also helps avoid your being blind-sided by "solving" a problem that has already been solved in a different field. Finally, when you are on the job market, you are likely to encounter people from a very wide range of areas, and you have to be able to meaningfully talk to them about their work and your work.

 It may also be helpful to try to get a sense of the people and culture in other fields. One way to do this is to take advantage of the talks at TTIC, and across campus. Even if you don't fully understand the abstract, you will at least learn something about the audience and their expectations and dynamics. Another way to get a sense of other fields is to attend community events run by the different groups around TTIC and campus. Finally, talk to your fellow graduate students!

Goals You may find it's useful to have written goals for the short, intermediate, and long term. Goals are not set in stone. You can always change them. What's important is to know what your goals are at any point in time so that you can make meaningful decisions based on pursuing them. Short term might mean the next quarter, or the next paper deadline. Intermediate term goals might be qualifying exams or your proposal, or an internship. Your long term goals should reflect what you intend to do next, after completing the PhD, and if you can, also try to paint out longer term career goals.

It's a good idea to have a conversation with your advisor and/or other faculty about your goals, especially when they change. Your advisor can help you shape what you're doing to increase the probability of achieving them.

Community TTIC is a community that includes all the PhD students, postdocs, faculty, and staff, and even the larger UChicago campus and neighborhood of Hyde Park. We encourage you to be part of that community. That may include joining community events, attending talks, participating in student organizations, helping other students, participating in and helping to organize workshops, teaching, enjoying what the city has to offer, etc.

Finally, every person in our community is expected to treat others with common decency and respect.

Program Prerequisites

Program Entrance Requirements
A student entering the PhD program is required to have a bachelor's degree (or similar degree for international students) in computer science or a related field. Applicants who hold a PhD degree from another institution will not normally be admitted.

Pre-Requisites
Graduate education at TTIC builds on ideas and material learned during undergraduate education. Specifically, the Institute expects the students to be familiar and comfortable with the topics listed in the table below. These subjects are considered a pre-requisite for graduate education and for required core courses at TTIC.

Recommended Pre-Requisites	
Subject Name	**Detail**
Discrete Math	Sets, functions and relations; boolean/logical arithmetic; modular arithmetic; basic graph concepts; basic combinatorics including inclusion/exclusion and generating functions.
Algorithms	Time and memory complexity analysis; sorting and searching; basic data structures: linked lists, trees, balanced trees, heaps; paradigms: greedy methods, recursion, divide and conquer, dynamic programming; basic graph and network algorithms: BFS, DFS, MST, shortest path algorithms, max flow
Probability	Probability space, events, random variables, independence; probability density function, mass function and cumulative density function; discrete and continuous probability distributions and random variables; mean, median, variance, moments; Bernoulli, binomial, multinomial, geometric, Poisson, Gaussian, multivariate Gaussian and exponential distributions; Convergence in probability and almost sure convergence*; Laws of Large Numbers; Central Limit Theorem
Linear Algebra	Vector spaces, matrices, linear transformations; elimination, inverse, and systems of equations; null spaces and image space; linear span, independence, basis, change of basis; orthogonality, projection, and the Gram- Schmidt procedure; unitary, rotation and permutation matrices; eigenvalues, eigenvectors and determinants; inner products and norms; semi-definite matrices; LU decomposition; matrix similarity and Jordan normal form; diagonalization and exponentiation
Programming	Familiarity with at least one general-purpose high-level procedural or object-oriented language such as C, C++ or Java; Data types; Variable scope; Pass by value/ by reference; Modularity, abstraction and reuse; Iteration and recursion

Upon entering the graduate program, the student will report on a *New Student Pre-requisite Form* (provided at orientation) how they fulfilled each of the topics in the table above, and discuss their background in these subjects with the Director of Graduate Studies (DGS) and with their advisor. Students who are missing a subject area or do not feel comfortable with some of the topics mentioned, may be prescribed independent study from a textbook (as recommended by TTIC) or online course, or may be recommended to take an appropriate UChicago course.

Based on the recommendation of the DGS and the advisor, the faculty may choose to **require** that a student either take a course at the University of Chicago to make up for a missing subject, or study the material independently and pass an appropriate exam. In such cases, the students will be notified of this requirement during their first quarter at TTIC, and the requirements should be completed within a year.

English Language Prerequisites and Further Enhancement for International Students:
To be successful in the academic program, it is essential that each graduate student is competent in understanding and communicating in English. The assessment of English competency will be made based on two factors: 1) the TOEFL or IELTS score, and 2) applicant interviews

Current English language proficiency requirements are listed on the institute website's Admissions page (https://ttic.edu/studentapplication) in the section 'English Language Requirements".

Advisors

Interim Advisor
Upon entry to the program the Institute assigns each student, in consultation with the student, an interim advisor.

Interim Advisors will assist students with course selection, initiating research, navigating the
Pre-Candidacy stage of the program, up through the Qualifying Exam, and will provide regular assessment.

Research Advisor
A Research Advisor assists the student through the Candidacy stage of the PhD Program. The Research Advisor(s) will head the student's thesis committee, and will offer guidance regarding research, thesis matters and post-thesis opportunities. In many cases, a student's interim advisor becomes their Research Advisor, but it is not automatic and should not be assumed without an explicit discussion with the interim advisor.

Students are encouraged to take the initiative early in talking about research with their interim advisor, as well as with any TTIC faculty member who interests them. Students should aim to find a good research advisor match by the end of year one, to allow time to work together in year two, and formalize the student-advisor agreement at the end of year two.

It is possible for a student to have a research advisor who is not a TTIC tenure-track faculty member, such as a TTIC Research Assistant Professor, a University of Chicago professor, a TTIC adjoint professor, or an external professor or researcher (subject to approval by the CAO). However, in that case the student will need to have an additional TTIC tenure-track faculty member research advisor who formally approves registrations, represents the student at assessment meetings, and can speak on student progress toward degree completion. A student may also have multiple TTIC tenure-track faculty research advisors.

The advisor relationship will be formalized on the *Application for Candidacy*, with signatures of both the student and advisor(s). This typically takes place in year two, following a successful Qualifying Exam. In the case of more than one research advisor, both/all advisors must sign the form. The form will be reviewed and signed off on by the Chief Academic Officer (CAO). The student submits this completed form to the Registrar (by week 8 of summer quarter, typically in a student's second year).

Change of Advisor
The relationship between a student and their advisor is a central aspect of the PhD program. This relationship requires the ongoing consent of both parties; either party can withdraw from a PhD research advising relationship by notifying the Chief Academic Officer. If a student has difficulty finding an advisor, they should seek the help of the Director of Graduate Studies (DGS) or CAO. The DGS and the CAO shall be notified of *all* changes in advisors.

When the advisor of a student is also the DGS, then any action or approval that is normally required by the DGS will instead be required of the CAO, and vice versa.

An Advisor on Sabbatical
There is a possibility that your advisor may take sabbatical for a period during your enrollment in the program. It is expected that the student and advisor shall maintain an ongoing academic relationship with regular contact. In cases where an advisor on sabbatical cannot maintain the regular contact and advisement responsibilities, a temporary local advisor will be assigned to the student by the Chief

Academic Officer. See TTIC's Intranet "Student Policies' section to read more on <u>An Advisor Taking Sabbatical: What to Expect.</u>

Residency Requirements

TTIC's degrees are in-residence degrees in the sense that the expectation is for the student to perform the degree work on campus in the Institute community with the faculty and other graduate students.

In-residence students are expected to reside within 50 miles of the TTIC campus, and regularly participate in on-campus academic activity, meetings, and courses (as appropriate given their current stage in the academic program) for the majority of the academic quarter.

The Institute requires the student to be in full-time residence (regular in-person attendance for courses, meetings and academic activity) until the Pre-Candidacy requirements are fulfilled, (mandatory residence and registration for autumn, winter, spring and summer quarters). A student may request to be not-in-residence for up to one quarter before Candidacy, typically summer quarter after their first or second year, subject to the following:

- Only one not-in-residence quarter is permitted before all Pre-Candidacy requirements are fulfilled. (Note: the student need not be in residence after the requirements are fulfilled but before Candidacy is approved.)

- Requests for absence must be made before the registration period for the quarter which the student is requesting absence, and must be approved by the student's advisor. Consult the Registrar or Human Resources for questions about residency for internships versus personal leaves.

Once in Candidacy, a student is required to have a minimum of three more quarters in residence before defending a thesis. If a student is out of residence for more than 3 consecutive quarters at any point in Candidacy, approval of the DGS is required to continue the absence. This is separate from All But Thesis status described below.

To be eligible for any degree, a student must complete the residency requirements as stipulated above.

Student Status: Defined

The following categories define the status options for students enrolled at TTIC:

- **Pre-Qualifying Candidate**- Student in the graduate degree program leading to a PhD degree.
- **PhD Candidate**- Student who has been approved for Candidacy after completion of the Qualifying Exam, fulfilled 1000 course units requirement, the Programming requirement, Research at TTIC Series requirement, and whose advisor has agreed to begin supervising thesis efforts.
- **Academic Probation**- This status is automatically imposed when a student fails to meet program requirements as specified in the Academic Program Guide, or does not maintain good-standing, or as formally dictated by the faculty where prior warning was given. To maintain good-standing as a full-time student and receive a stipend, students must officially register by specified deadlines. Eligibility to register includes meeting the deadlines stated in the Academic Program Guide, Student Handbook and additional individual-specific requirements and deadlines previously communicated to the student. Academic Probation results in a <u>20% reduction in stipend</u> and continues until stipulated requirements have been met. Unless a student rectifies issues of Probation within the

quarter, the student will automatically be moved into Suspended status on the first day after the end of the quarter in which Probation status was imposed.

- **Suspended**- If faculty determines a student is "suspended," that student's TTIC and University of Chicago privileges are suspended, along with the student's living stipend, and the student's registration for any course(s) is canceled. Suspension may occur if a student does not complete the necessary adjustments required in Academic Probation, and any course(s) the student is registered for is canceled. Suspension may occur if a student has very dissatisfactory performance after a period of being in Academic Probation, or disregards crucial program deadlines and requirements.
- **Student-at-Large**- Registered for special study but not a candidate for a TTIC degree. Students from TTI Japan taking courses at TTIC are considered Students-at-Large.
  Full Time Enrollment Status- This status is accorded to all students enrolled who undertake an academic workload consisting of any (advisor-approved) combination of courses, work experience, research or special studies that would be considered a full-time workload. A student must be enrolled in at least one course (100 units) each quarter, for a letter grade, to be considered full-time. A full-time internship is an exception: it is considered full-time enrollment, but does not receive a letter grade. (Students who may fall below full-time status should consult Human Resources to consider stipend, USHIP and visa implications.)
- **All But Thesis Status (ABT)**- This status may be accorded to a student who's only remaining requirements are the defense and final submission of their thesis. Once a student has successfully proposed a thesis, ABT status may be requested and must be approved by both the thesis advisor and Director of Graduate Studies. A student will register for this status, as they would a course during the registration period, and notify the Registrar (via *Out of Residence Form*) if they will not be in-residence. In-residence students may still receive health insurance and campus privileges and are expected to physically be at TTIC. Non-residence students will not receive campus privileges. Stipend support while on ABT will be determined on a case-by-case basis, dependent upon student progress and external employment status. It is the student's responsibility to confirm the details of his or her ABT status privileges. A student may remain in ABT status for a maximum time of four quarters. After four quarters, a student is terminated from the program unless they petition the Director of Graduate Studies to remain a Candidate. Any petition must be submitted to the Director of Graduate Studies before the allowed time of four quarters ends.
- **Leave of Absence (LOA)**- This status applies to students who have arranged an "interruption" to their ongoing study at the Institute, for a designated allowance of time. LOA may further be classified into Voluntary LOA and Involuntary LOA. All terms of a LOA will be documented between the student and the Institute. Details are included in the LOA policy on the Intranet under "Student Policies" and in the Student Handbook.

All students enrolled in the TTIC degree program are expected to be in full-time status at all times. Exceptions to the above must be in writing from the Director of Graduate Studies.

Student Progress/ Academic Evaluation

To ensure students are on track to meet the requirements necessary to progress through the program, regular student progress reviews are conducted by faculty.

Twice a year, at the beginning of the fall and spring quarters, the faculty will hold a review and evaluation meeting to discuss each student's standing and progress in the program.

The faculty will discuss and determine for each student whether that student is making sufficient enough progress in academic goals to continue in the PhD Program. In the event that a student is not meeting their academic obligations, they may be notified of being placed on Probation or they may be notified that they are not permitted to continue with the program. In any case, a **letter of evaluation** is written to each

student by their advisor, based on the discussion in the meeting, to be signed by the advisor and the Director of Graduate Studies. This will take place from the first year of study until a student completes (or leaves) the program.

Before the autumn and spring Student Evaluation meetings conducted by the faculty, students are notified to complete a *Student Data Form* and update their individual publication lists to document progress in the program and in academic performance. Students will meet with their advisors to review the data, allowing the advisor and student to have a mutual understanding of the student's progress and plans, and the advisor can accurately represent the student's standing in the program to the rest of the faculty in the evaluation meeting.

TTIC has a full *Assessment Plan* viewable on the Intranet, which encompasses both student and program assessment practices and allows faculty to support student progress toward degree completion, and keep the PhD program current and of high quality.

Grade Policy

Grade Policy
All core required courses as identified in the PhD curriculum require a letter grade in order to receive credit toward program requirements. For elective courses, pass/fail grades are allowed, and, if the instructor is not using a grade system, it is not required that the student receive a grade. A passing letter grade is a D or above.

In general, the student will receive the type of grade consistent with the instructor's grading system for the course. However, if a student desires a different type of grade, such as a pass/fail or audit designation in a letter-grading system, they must attain that status or request such by the end of week 5 of the quarter.

Instructors submit final grades to the TTIC Registrar the Wednesday following the end of autumn, winter, spring and summer quarters. For University of Chicago courses, grades are typically submitted the Tuesday following the end of the quarter.

TTIC uses the following grades:

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

The full TTIC Grades Policy for Instructors can be found on the TTIC Intranet under 'Academic Policies.' University of Chicago grade policy can be found through the University Registrar website (but may vary slightly by department).

Pass/Fail
If a student is requesting a pass/fail grade for an elective course, they must obtain that status before the end of week 5 of the quarter. "P" indicates that the student has submitted sufficient evidence to receive a passing grade, as determined by the course professor. Pass grade option should be used rarely, as this grading outcome does not count towards any program requirements. "F" grade indicates fail, and that the student did not meet the requirements as arranged with the instructor. Requests for pass/fail should be made directly with the course instructor as should the terms for achieving "sufficient evidence to receive a passing grade."

Audit
Auditing is presence in a classroom without receiving academic credit or a letter grade. The extent of participation must be arranged and approved by the course instructor. If a student is requesting audit status for a course, they must obtain that status before the end of week 5 of the quarter. Grade "AUD" is

reported on the transcript but does not count towards any program requirements and does not award credits. Requests should be made directly with the course instructor as should the terms for what is expected of the student auditing the course.

Incompletes
In the case of a student not fulfilling course requirements due to failure to complete all coursework prior to the end of the quarter, the instructor may give an "I" (Incomplete) rather than a grade, and this shall be recorded in the student's academic record. The "I" will remain on the student's record until such time as he/she completes the coursework, and a new grade is submitted to the Registrar by the instructor, but no longer than one quarter after the course concluded. If coursework is not completed by the end of the following quarter, the grade automatically becomes a "W" withdraw (see below).

Withdraw from Courses After Add/ Drop Deadline
A student may drop a course in the first three weeks of the quarter and it will not appear on his or her transcript. After week 3, a student must explicitly request a "W" (withdraw) from the instructor of the course if they do not intend to complete the course. This must be requested prior to the final paper, the final exam or the last day of the quarter, whichever comes first. A permanent grade notation of "W" (withdraw) is automatically recorded on the student's transcript for that course. The TTIC Registrar must be notified if a withdraw has been elected by the student.

Students should check with Institute officials before withdrawing from a class which could potentially place them below full-time status, resulting in being ineligible for scholarship support or for international students on an F1/J1 visa, could risk violating their legal status.

Course Units Awarded
Earning a passing grade in a course (D or above) awards the full unit count for that course. (See *Credits* section below for full details.)

Grade Change Appeal/Request
If a student requests that a course grade be changed after final grades are posted, they may petition the course instructor for a grade change, based on extra study, an exam, a project, or other arrangements as determined by the instructor. Students should petition in writing to the instructor who taught the course in the quarter in which the student received their current grade. The decision on whether to allow such an arrangement, and the exact mechanism for its fulfillment, are subject to the discretion of the instructor. (Note that only 'letter grade' changes are permissible after a quarter has concluded: grades cannot be updated to a Pass/Fail, Withdraw, or Audit after the quarter has finished, nor can a Withdraw be updated to a letter grade at any point.) The instructor must file the grade change through the TTIC Registrar.
No grade changes are permitted after a student graduates or permanently exits their program of study, except under highly extenuating circumstances, and will be examined on a case by case basis, determined by the Registrar.

Re-taking a Course
If a student re-takes a course, both grades will appear in the transcript, in their respective academic quarter listings, with only the most recent grade applying towards the program requirements.

The Quarter System

The academic year consists of four quarters. All students take courses in the autumn, winter, and spring quarters. Summer course offerings are limited, and the quarter is commonly used for internship opportunities or, with advisor approval, focused research endeavors.

The autumn, winter, and spring quarters consist of nine weeks of classes plus one week of final examinations. Summer quarter is ten weeks in total. Each quarter is a complete unit of work.

New students may be accustomed to the rhythm of a semester system, and find that adjusting to the quarter system is a challenge that usually requires changing study habits and improving time management skills. Because the quarter passes quickly, students must be prepared to begin working seriously on their studies in the first week of the quarter.

Credits

The course unit is the measure of credit at TTIC. Most Institute courses typically award 100 units. Alternate units may be awarded based on varying degrees of work, instruction hours or other factors. Each 100 unit course is equivalent to 3.3 semester hours or 5 quarter hours. Candidacy requires 1000 units to be completed, and an additional 200 units are required post-Candidacy to obtain the PhD.

Earning a passing grade in a course awards the full unit count for that course. See the full Credit Policy on the TTIC Intranet under 'Academic Policies.'

TTIC and University of Chicago maintain similar course credit measurement as courses and credits may be shared. The University Registrar maintains the University's credit definition. TTIC determines course credits as part of its Curriculum Review process.

Modalities
Instruction may be performed via different modalities, but should maintain that at least 50% of the contact hours be conducted in-person. In cases of advisor sabbatical or other circumstances which require an advisor or instructor to be away, a secondary or local advisor may be assigned to perform contact hour interactions.

F-1 and J-1 student visa holders may have additional modality requirements that they need to abide by to maintain visa compliance. Instructors, advisors and student visa holders are encouraged to coordinate with the institute International Affairs office.

External Course Credit
Select high quality courses and external special programs with highly qualified instructors and researchers may offer exceptional supplemental learning and experience to students enrolled in the PhD program. Students may request external credit opportunities. Qualifying courses may be approved for designated credit and applied to transcripts. To initiate an External Course Credit request, consult the External Course Credit Policy on the Intranet under "Student Policies."

Transcripts

Students (of any status who have an active Populi account and have taken at least one course) can access their academic transcripts anytime by logging into Populi and on the 'My Profile' page, select the 'Student' tab. Students may download their own unofficial transcripts, or request an official transcript. The official transcript is processed by the Registrar, and may be hard copy (signed with an embossed seal), or a digital PDF. Transcripts may be sent to third-parties at the student's request via Populi transcript request function.

TTIC does not charge a fee for transcripts.

Requests for official transcripts are typically processed within 2-3 business days. Add additional time for mail delivery of paper copies. Requests are not processed over the weekend or over Institute holidays.

Unofficial transcripts are available for immediate download using the same process for official transcripts.

Only TTIC transcripts may be requested or released from the TTIC Office of the Registrar.

<u>Academic Honors</u>
Academic honors awarded to a student such as Thesis of Distinction, Niyogi Fellowship, and/or Outstanding TA Award shall be noted on transcripts.

Enrollment Verification Requests

An Enrollment Verification is an official document that confirms active enrollment at TTIC, and may list enrollment start date, expected program completion date, any awarded degrees from TTIC, advisor and area of study, or additional information a student specifically requests regarding their student status.

Students may need verification of enrollment to defer student loans, to prove enrollment for an insurance, to verify degrees for prospective employers, for visa or immigration purposes or to show proof of academic standing to enroll in another institution. All requests for verification must be submitted by the student through the *Enrollment/ Degree Verification Request Form* on the Registrar site (under Forms) or in person in the Office of the Registrar.

Verification of directory information (name, address, enrollment date, expected graduation date, student status, and receiving scholarship support) may be released without the student's signature. (If a student has chosen to restrict his or her directory information, a written release from the student is required in order to process the request.)

Any confidential information (such as academic grades, or actual scholarship stipend amount) will only be released with the student's documented request (via the Enrolment/ Degree Verification Request Form), in accordance with the Family Educational Rights and Privacy Act of 1974.

Enrollment Verification letters may be in hard copy format, or PDF digital format, and provided to the student or a third-party upon student request.

Degree Verification Requests

Degree Verification is an official document that confirms a student has completed a degree(s) at the Institute. All requests for verification must be submitted by the student through the *Enrollment/ Degree Verification Request Form* on the Registrar site (under Forms) or in person in the Office of the Registrar.

Enrollment Verification letters may be in hard copy format, or PDF digital format, and provided to the student, or a third-party upon student request.

COURSES AND REGISTRATION

Courses Offered

A list of current and upcoming courses, along with course details, pre-requisites and instructor listing is maintained on the TTIC website (*www.ttic.edu/courses*).

A list of active courses a student may register for will be accessible inside Populi (*https://ttic.populiweb.com*) or my.uchicago.edu while registration periods are open.

Registering for Courses

Requirements
Each quarter, to maintain student status, **students are required to register for at least 100 units (receiving a letter grade)** during the early registration period which begins four weeks prior to the start of the quarter. Students must receive a letter grade for a minimum of one course each quarter (excluding quarters in which they are registered for internships or ABT). Pass, Audit or Withdraw courses do not qualify. Students are expected to consult their advisor regarding the number and selection of courses, prior to registration each quarter.

Students that are not registered for a minimum of 1 course at any time will be considered to be inactive, and will be placed on Academic Probation. The student must then petition the DGS to register for a course or courses and move out of Academic Probation. If the student is allowed to register and resume active status, student privileges and full stipend (if applicable) will be reinstated.

To Register for TTIC, UChicago
To register, students login to their TTIC Populi account (*https://ttic.populiweb.com*) and enroll in courses (both TTIC and UChicago courses) for the upcoming quarter. Populi registration portal may be accessed from the Registrar site. Student registration actions are–electronically forwarded to, and the registration must subsequently be approved by advisors to be valid.

If the student is registering for University of Chicago courses (such as CMSC, MATH, STAT courses,) the student *must also register* at *classes.uChicago.edu*, the University of Chicago student registration system, using their cNet ID. Credit may not be awarded if the student is not enrolled for UC classes in the UC system. This includes Independent Research courses with University faculty.

Students may sit in on a number of classes at the beginning of each quarter, without officially registering for them. However, they must decide by the end of week 3 of the quarter whether they will register for the course. If they do register for that course, they must fulfill all course requirements, including any assignments, tests, projects or the like they may not have completed in the first three weeks (while they were not registered).

Add/ Drop
Accordingly, the Add/Drop deadline is the Friday of week 3 each quarter, and no adds or drops are allowed after that date. Students use the Populi portal to Add/ Drop similar to how they registered. Dropped classes are not reflected on transcripts.

After the Add/Drop period, if a student cannot complete the requirements of a course, the options available are:

1) Request from the instructor a *Withdraw* from the course at any time prior to the last assignment, test or day of the course, (with a W recorded on the transcript) or
2) Receive an "*Incomplete*" for a grade if all required coursework and/or tests are not completed, with the intention to complete the work.

All changes in course enrollment status should be reported to the TTIC Registrar. The implications of withdrawals and incompletes are stated in the section "Grading Policy/Incompletes/Withdraws". University of Chicago courses not registered in TTIC's Populi by the end of add/drop period may be canceled automatically by the TTIC Registrar and will not apply to your academic transcript for credit.

PRE-CANDIDACY REQUIREMENTS

TTIC does not offer a terminal Master's program. Students who fulfill the requirements as discussed below during the Pre-Candidacy period may receive an accredited Master's diploma before continuing on to become a PhD Candidate. The chart on **page 18** illustrates a general timeline of requirements and milestones to achieve throughout stages of the program as a Pre-Qualifying Candidate.

Pre-Candidacy Course Requirements

Students are required to take a total of 1000 units for partial fulfillment of the requirements, during their Pre-Candidacy period. Earning a passing grade in a course awards the full unit count for that course.

During the Pre-Candidacy period, a student must complete the following combination of classes from the following categories, as illustrated in the chart below:
>   All 300 units from List A, and a total of at least 500 units between lists A, B and B.1.
>   200 more units are needed between lists A, B, B.1 and C.
>   300 more units from lists A, B, B.1, C , and/or D.

Five courses from list A, B and B.1 must be completed before taking the Qualifying Exam (details below,) and must have a letter grade of B- or better.

Overall grade and course requirements are laid out in the two following charts.

Timeline and Requirements Chart for Pre-Candidacy Period

Enrollment ⟶

Complete Responsible Conduct of Research Training	First 5 (non-summer) quarters at TTIC	Submit Application for Qualifying Exam — Spring Quarter Week 2	Spring quarter to August of 2nd year	Qualifying Exam	Apply for Master's Diploma/ Candidacy — Summer Quarter Week 8 (at latest)
	300 units from List A				
	200 units from List B or B.1				
	3 courses must have A- or better scores, 2 courses must have B- or better scores (out of 5 courses taken prior to Exam)		Schedule & prepare for the Qualifying Exam		
	Research at TTIC Series Requirement *Completed the first Autumn, Winter, Spring Quarters of enrollment*				
	Programming Requirement *(Consult with advisor and Programming Requirement Faculty)*				
	200 units from List B, B.1 or C. All must have B- or better scores.				
	300 more units from List B, B.1, C or D. All must have passing letter grades.				
	Student Talk Requirement *To be completed in student's first 4 years (prior to thesis proposal)*				

List A Core Requirements	List B Depth Electives	List B.1 Application Electives
Algorithms *TTIC 31010 (100 units)*	Computability and Complexity Theory *TTIC 31060 (100 units)*	Intro to Computer Vision *TTIC 31040 (100 units)*
Intro to Machine Learning *TTIC 31020 (100 units)*	Convex Optimization *TTIC 31070 (100 units)*	Intro to Bioinformatics *TTIC 31050 (100 units)*
Mathematical Toolkit *TTIC 31150 (100 units)*	Approximation Algorithms *TTIC 31080 (100 units)*	Speech Technologies *TTIC 31110 (100 units)*
	Signals, Systems & Random Processes *TTIC 31090 (100 units)*	Topics in Bioinformatics *TTIC 31160 (100 units)*
	Computational and Metric Geometry *TTIC 31100 (100 units)*	Planning, Learning & Estimation for Robotics and Artificial Intelligence *TTIC 31170 (100 units)*
	Statistical and Computational Learning Theory *TTIC 31120 (100 units)*	Natural Language Processing *TTIC 31190 (100 units)*
	Probabilistic Graphical Models *TTIC 31180 (100 units)*	Advanced Natural Language Processing *TTIC 31210 (100 units)*
	Information and Coding Theory *TTIC 31200 (100 units)*	Self-driving Vehicles: Models and Algorithms for Autonomy *TTIC 31240 (100 units)*
	Unsupervised Learning and Data Analysis *TTIC 31220 (100 units)*	
	Fundamentals of Deep Learning *TTIC 31230 (100 units)*	
	Introduction to the Theory of Machine Learning *TTIC 31250 (100 units)*	
	Complexity Theory *TTIC 38800 (100 units)*	

List C: Supporting classes in the student's research area, approved by the advisor. Classes should generally be regular graduate-level TTIC, UofC Computer Science, UofC Math or UofC Statistics classes consisting of coursework and/or a project and/or an exam. *Reading classes, pass/fail classes or special topics classes will not generally be approved. (100 units)*

List D: TTIC 55000 Independent Research *(100 units)* | TTIC 56000 Independent Reading *(100 units)*
TTIC 40000 Special Topics Courses *(varying units)*

Course Exemptions

Students may petition for exemption from List A courses based on very similar graduate level courses from other institutions in which they performed well (generally, received an A-, A, or A+).

Exemption petitions should be completed in the student's first year at TTIC using a ***Course Exemption Request Form*** from the Registrar website, and should be submitted to the TTIC instructor scheduled to teach the course. Course exemption is decided on a case-by-case basis. Such exemptions will be noted as "*exemption-no credit*" in the student's record. Even if such exemptions are granted, the student is still required to complete the 500 units from Lists A, B and B.1 by the end of winter quarter of their second year, by taking additional course(s) from List B or B.1.

Transfer Student Course Requirements

Students transferring to TTIC from programs leading to a PhD in other institutions may be granted credit for up to three courses toward the above course requirements based on similar courses taken at the other institution in which they performed well (generally, received an A-, A or A+). This is true for programs in which a master's degree is obtained on the way to a PhD, but not for terminal Master's programs.

In cases where a TTIC student received University of Chicago transcripted credit for a TTIC List B or B.1 course, the course credits and grade will be accepted as transfer credit (regardless of if taken as an undergrad or graduate student). Courses on TTIC's List A courses may be requested for Exemption and if awarded, will not count towards grade or course requirements.

The maximum transfer credit allowance is 300 units (even when using TTIC courses).

The request for credit should be made during the first quarter at TTIC using the *Transfer Student Credit Request Form*. Credit awarded will be determined by the Director of Graduate Studies in consultation with faculty who oversee courses related to those submitted for credit approval, with the decision made on a case-by-case basis. If transfer credit is approved, up to 100 units per course is awarded towards the 1000 unit degree requirement.

If a student receives credit for one or more courses, the following grade requirements are in effect:

Course Units Transferred (from other institution)	TTIC Units Prior to Qual. Exam (student must still take)	Adjusted Grade Requirement (for TTIC courses taken)
100	400	One grade below A- is allowed
200	300	All grades must be a minimum of A-
300	200	All grades must be a minimum of A-

In cases where a student took a course at TTIC as a non-degree student, and later matriculates, the credits shall be eligible for transfer credit subject to approval of the transfer request.

Responsible Conduct of Research Training

Within 30 days of initial enrollment at TTIC (or prior to enrollment), a student must successfully complete Responsible Conduct of Research (RCR) training. TTIC's objective through student RCR training is to inform about the basic rules that apply to responsibly conduct research- such as ethical considerations when performing research, or the permitted use of research funding, and so on. RCR training is designed to provide the student research community with knowledge about expectations and protocol, enabling each member to be responsible in an academic research community. Candidacy will involve more independent research, and the training is a first-step in preparation.

AT TTIC, RCR training is completed online through the CITI program. Students must take the online course, and pass a quiz on the material, passing with an 80% or better. Test results will be relayed to the Office of the Registrar, and results are valid for up to ten years. Instructions for completing training may be found on the *Registrar website*.

Students that do not successfully pass training within 30 days will be placed on Academic Probation. Academic Probation results in a 20% reduction in stipend and continues until stipulated requirements have been met.

Programming Requirement

As part of the TTIC program, students must have or acquire experience in computer programming with a general purpose programming language. Students must demonstrate that they have designed and implemented some substantial software system, either from scratch or as a significant extension to existing software.

The student must be responsible for the design of the software or the extension. The software does not have to be "industrial strength", i.e., it does not have to be polished to the point where it is ready to be released to a user community. A simple demonstration of some algorithm or idea is sufficient. However, the problem should be large enough that significant systems engineering issues are addressed.

This requirement can be satisfied through a summer programming job, programming experience as an undergraduate, or by independently writing software, provided that the above criteria are satisfied.

TTIC has appointed a member of the faculty as "Programming Requirement Administrator." Students should consult with this faculty member to make sure that whatever project they embark on or have embarked on is substantial enough to provide actual "programming experience." After completion of the project, students will submit a report to the Programming Requirement Administrator for approval. ***This requirement must be fulfilled before <u>applying</u> for the Qualifying Exam.***

Research at TTIC Seminar Requirement

TTIC professors are constantly re-examining the boundaries of computer science, expanding their areas of study, and publishing new insight for the consumption of computer scientists around the globe. Much of this research is presented during the Research at TTIC seminars, where professors talk about their most current research. TTIC's Research at TTIC Seminar Requirement requires students to register for course "TTIC 31000: Research at TTIC" and attend these seminars in their first autumn, winter and spring quarters at TTIC. Students receive a pass/fail grade. Three quarters with a "pass" grade constitutes fulfillment of the requirement. This requirement is intended to familiarize students with emerging areas of computer science, and promote the opportunity for engagement with faculty and visitors who may play a role in the students' future research endeavors. Seminars are typically on Fridays. Students are expected to attend all seminars to gain awareness and exposure to emerging areas of computer science, outside their immediate area of study.

Student Talk Requirement

TTIC students are required to give an advertised talk on research work the student has directly been involved in, to a TTIC audience, <u>prior to</u> proposing a thesis. Students may complete this requirement in Pre-Candidacy, or in Candidacy. Full details of the requirement are described in PhD Candidate Requirements.

Teaching Assistant (TA) Requirement

TTIC students are required to TA for one quarter, <u>prior to</u> proposing a thesis. Students may complete this requirement in Pre-Candidacy, or in Candidacy. Full details of the requirement are described in the 'PhD Candidate Requirements' section of this guide. This requirement does not need to be completed before taking the Qualifying exam, or applying for a Master's diploma/ Candidacy.

Qualifying Exam

Each PhD student must pass a Qualifying Exam administered by an Examination Committee. Five core courses and the Programming Requirement must be completed before the ***initial exam application is submitted, by the end of week 2 of the spring quarter of the student's second year.*** Extensions for special circumstances can only be approved by the DGS, and must be confirmed *before* the week 2 deadline. It is recommended that a student apply for the exam as soon as they are eligible to apply, without delay.

The Registrar site's Qualifying Exam page lists specific deadline dates and submission instructions for the student, leading up to the exam date. The ***Qualifying Exam Application Form*** is found on the Registrar site.

Once a student applies for the exam, the DGS will appoint an Examination Committee for each exam. The student should schedule an exam at a time convenient for themselves as well as the examiners, prior to the end ***of week 8 of spring quarter***, and reserve a conference room. For 2nd year students, it is recommended to have taken the exam by week 2 of summer quarter.

Exam Committees and Student Activity Prior to Exam

Once a student applies for the exam, the DGS will appoint a three-person Exam Committee with an Exam Chair for each exam. The student should schedule an exam at a time convenient for themselves as well as the examiners, prior to the end of ***week 8 of Spring Quarter***, report the exam date to the Registrar and reserve a conference room. It is recommended to have taken the exam by week 2 of Summer Quarter.

The student should submit the exam forms to the Exam Chair six weeks before the scheduled exam. The committee will assign exam readings to the student and return the form. The student will have 4 weeks to prepare.

One week before the exam, the student shall submit a written summary of the readings to the Exam Chair.

Full Qualifying Exam instructions, forms, dates and submission instructions for the student, leading up to the exam date are listed on the Registrar site's Qualifying Exam page.

All exams must be passed by week 8 of summer quarter, when Candidacy Applications are due.

Qualifying Exam Description

The goal of the exam is to allow the student to demonstrate their ability to absorb, summarize, present, and apply new research and/or technical ideas, as well as apply them in the context of key concepts in TTIC List A and B core courses. By passing the Qualifying Exam a student demonstrates the readiness and competence to undertake thesis level research.

The student is given reading material which may require understanding some concepts outside of their immediate research area. The student is required to submit a written summary of the material they were assigned, give a presentation based on the assigned material, and answer any exam committee questions about the material. Students are evaluated on their ability to reason about and explain the given material, as well as to apply the concepts discussed in the material. The written component tests the student's ability to extract, organize and explain technical ideas in a logical manner. The oral component includes questions during the exam that test students' ability to extrapolate and apply the concepts from the given material and the courses mentioned in the exam form.

Exam Format

- One week before the date of the exam, the student is required to submit the written summary to the exam committee. The length of write-up should be, at most, 4 pages. The summary may also include a description of any results or concepts not covered in assigned material that the student thinks might be helpful in understanding the material. The committee decides as a group, the quality of the summary, and it's noted formally on the exam forms. The Exam Chair shall provide a copy of the written summary to the TTIC Registrar for the student's academic record. The committee may communicate (informally) with the student prior to the exam regarding the summary, and can give feedback, or caution a student if understanding of the material may need further work. Students should summarize their understanding of the assigned material in their own words and may not copy any material directly from the paper or other sources. If something needs to be quoted (e.g. a theorem statement) a reference should be included.

- The exam consists of a presentation by the student based on the reading material (and any other concepts/results necessary for context), and questions from the exam committee. Students may use a whiteboard or digital slides for presentation. The length of the presentation should be limited to 45 minutes. The committee may interrupt with questions during the presentation and may ask additional questions after the presentation. These may include questions directly based on the content, or on applying some of the concepts to a different problem. The questions may also test the knowledge of concepts covered in the List A and List B courses taken by the student.

Exam Outcome

Exam Outcome
The examiners must reach consensus on the outcome of the exam, and mark the outcome on the exam itself, which the student will provide at the exam. Possible outcomes are:
- Full pass. This results in a recommendation to continue in the Ph.D. Program.
- Continuation. A continuation means that the student did not yet pass the exam and must still complete it before continuing in the Ph.D. program. A continuation of the examination must be scheduled with the same committee and possibly with additional reading material. A continuation exam cannot result in a second continuation or conditional pass. The outcome must be either pass or fail.
- Conditional Pass. A conditional pass may be given when the committee requires that the student provide additional work, but does not feel the need to have a second exam. The committee then provides the student with a list of requirements that the student should fulfill to pass the exam, and a time-frame for doing so. A conditional pass must be updated to a pass or fail after the deadline given by the committee.
- Fail. If a student fails the qualifying exam, they must leave the PhD program or petition the Director of Graduate Studies to continue in the program and retake the exam. The exam committee also gives a recommendation on whether the student should be permitted to retake the exam. However, this is only a recommendation, and if a student would like to retake the exam, the student needs to petition the Director of Graduate Studies to retake the exam and continue in the program.

Committee Feedback

The examiners will provide formal feedback orally to the student regarding their performance in the exam, and all members of the committee are responsible for completing the exam feedback form itself, which will become part of the student's academic record at TTIC, and indicates exam outcome. The student provides this form to the committee at the time of exam. Forms should be completed by the exam committee and submitted to the Registrar the same date as the exam.

The committee feedback becomes a part of the student's academic record, and parts of it are shared with the student.

If the exam committee determines a Continuation Exam is necessary, the oral feedback and feedback on the exam forms should be focused to advise the student on improvements to perform or prepare better on the continuance exam.

Continuation Exams
The student once more works with the (same) committee to schedule a continuance exam date, and a new exam. Exam outcome and committee feedback responsibilities are identical to an initial exam, and feedback is shared with the student and becomes part of their academic record. All exams must be passed by week 8 of summer quarter, when Candidacy Applications are due.

Repeat Exams
The DGS will appoint a new exam committee and the student initiates contact and exam scheduling with the new committee and goes through steps as if it were an initial exam. Exam outcome and committee feedback responsibilities are identical to an initial exam.

All exams must be passed by week 8 of summer quarter, when Master's Diploma/ Candidacy Applications are due.

Application for Master's Diploma/Candidacy

After passing the Qualifying Exam and completing all requirements of Pre-Candidacy (see chart **p.16**), a student may **apply for Candidacy** by the end of **week 8 of summer quarter** (of their second year of study), submitting the *Application for Candidacy* to the TTIC Registrar. An accepted Application for Candidacy automatically qualifies a student for a Master's within the PhD Program as well. Master's diplomas are awarded each fall at the beginning of the academic year (usually late September). Students whose applications are accepted and will be awarded diplomas will be notified during the summer of the exact date of the diploma ceremony.

If a student does not yet qualify for Candidacy, they may still be eligible and meet the requirements to apply for the Master's diploma within the PhD program if they have satisfied the following requirements:

List A	3 courses	*4 of the 5 courses should have grades of B- or better. Remaining units must have passing letter grades of D or higher: "P" pass grades will ~~not~~ qualify.*
List B or B.1	2 more courses	
List B, B.1, C	200 more units	*All 500 units must have passing grades of D or higher. "P "pass qualifies.*
List B, B.1, C, D courses	300 more units	
	10 courses/ **1000 units**	*Passing grade in most courses earns 100 units. (Exception: TTIC 31000 Research at TTIC, TTIC 57000 Computer Science Internship, and Special Topics courses.)*

Application for Master's within the PhD Program are due by the end of **week 8 of summer quarter** to the TTIC Registrar.

Any requests for an extension to meeting the Master's Diploma/ Candidacy Application deadline must be submitted in writing to the Director of Graduate Studies by week 8 of summer quarter, the same as the Master's Diploma/ Candidacy Application deadline.

Computer Science Internships

Internships can play a crucial role in a student's professional development, providing a valuable opportunity to gain relevant experience, and to get a realistic perspective on what it is like to work within a given field outside of the student-advisor academic dynamic.

TTIC 57000 Computer Science Internship is described as: In-depth involvement in areas of computer science in a research lab, University or business setting. Internship activities and objectives must be related to the student's program objectives. Advisor's Consent Required. (F-1 visa holders are required to apply for CPT internship with the TTIC International Affairs Office.)

Students wishing to enroll in an internship should pay attention to the Residency Requirements section of this guide, and discuss options with their advisor and/ or the Administrative Director of Graduate Studies. Note: some student privileges are based on being in-residence. An Internship registration is for a 3-month period: an academic quarter.

Students must notify the Institute of their internship by registering for TTIC 57000 (or TTIC 57005) as they would a course, prior to the quarter in which they will participate, during the registration period. The student must also complete an *Internship Notification Form* found on the TTIC Registrar site, under 'Student Forms'.

International students should inquire with the International Office early in advance of exploring an internship and have all documentation in order so the employment arrangement may take place on time.

To request an internship exceeding one quarter, or an extension to an existing internship, a student shall petition the Director of Graduate Studies at least 6 weeks prior to the start of the quarter in which the internship shall take place. The Director of Graduate Studies will consult with the advisor, Registrar (and International Office if CPT is used) and determine approval.

Student Privileges While on Internship
Students staying in Chicago (and up to 50 miles from TTIC) will maintain in-residence student privileges, including campus privileges, and building access.

Students who are 50 miles or more from TTIC should report themselves out of residence status inside my.uchicago.edu. While not in-residence, some on-campus privileges for the quarter will be terminated, and resume with your return to campus. Consult the TTIC Registrar if you may require campus privileges during a not-in-residence internship.

All students on an internship will continue to receive student health insurance coverage through USHIP if you were enrolled prior to the internship.

Students who are paid as an intern are paid by the internship host, and the TTIC stipends resume when the student resumes study at TTIC. Consult the *Student Funding Policy* section 5.5.

Out-of-Residence Reporting
If your internship will take you outside Chicagoland, you will **need to report out-of-residence** to both TTIC and UChicago so that Student Services Fees for campus services will be paused for the quarter.

Report to TTIC via the Registrar site *Out-of-residence form*.

The Student Services Fee Waiver is available online at my.UChicago.edu (go to Finances > Account > Students Services Fee Waiver). The Student Services Fee Waiver tool opens during Week 10 of each quarter for the upcoming quarter and closes at the end of Week 3 of the quarter of application.

Any Student Services Fees that are charged while you are outside Chicago for the quarter will be the student's responsibility to pay. TTIC only pays campus Student Services Fees for the quarters the student is in-residence in Chicago. (See Student Services for questions.)

<u>Credits</u>
TTIC 57000 Computer Science Internship does not award credit and does not qualify towards a degree. It is considered full-time student status for the period the student is registered and participating in an advisor-approved internship, 20-40 hours per week.

TTIC 57005 Part-Time Internship is an internship that requires minimal time of engagement: no more than 20 hours per week. The student remains in-residence at TTIC. Advisor approval is required. It does not award credit and does not qualify towards a degree.

PHD CANDIDATE REQUIREMENTS

There are four main required components of the PhD program, as follows.
- Course requirements, including the Application Requirement, and meeting grade requirements
- Programming, Research at TTIC Seminar, TA Requirement and Student Talk Requirements
- Passing the Qualifying Exam
- Doctoral thesis and defense

Full details for the Pre-Candidacy portion of the PhD program are explained in the "Pre-Candidacy Requirements" section of this Guide. Course requirements as a PhD Candidate and thesis details are found in the text below. A timeline reference chart of the Candidacy requirements may be found on **page 30**.

Candidacy

Approval for Candidacy indicates that a student is moving into a more advanced stage of the PhD Program, permitting him/ her to devote most of their time to research and writing a thesis.

Admission to the PhD program does not automatically include approval of Candidacy. The TTIC faculty will evaluate the progress of the student and determine that the student has completed all course and other requirements, passed the Qualifying Exam, and is otherwise qualified to do work at a level required to complete a doctoral thesis.

To become a PhD Candidate and therefore allowed to continue in the program, a student must have completed 1000 course units as detailed in the requirements chart on **page 18**, the Programming requirement, Research at TTIC Seminar requirement, passed the Qualifying Exam, completed Responsible Conduct in Research training, have a research advisor willing to supervise the student's PhD thesis work, and have Candidacy approved at a student evaluation meeting (typically during autumn quarter of a student's third year). These items are noted on the Application for Candidacy. If all requirements are met, and Candidacy is approved by faculty, the Director of Graduate Studies will officially notify the student that they have become a PhD Candidate.

If Candidacy has not been approved by autumn quarter of a student's third year, and no special arrangements have been approved by faculty, the student will be asked to leave the program. Student requests for extensions must be submitted in writing prior to week 8 of summer quarter.

The outcome goals for PhD graduates:

- The student understands and can conduct high quality, responsible and original research culminating in a doctoral thesis which can be successfully defended in a public forum and published.
- The student is experienced in course instruction and course management activity.

Research Advisor

As part of the Application for Candidacy, the student must select a research advisor and request the advisor confirm the arrangement with a signature.

The relationship between a student and their advisor is a central aspect of the PhD program. This relationship requires the ongoing consent of both parties - either party can withdraw from a PhD research advising relationship by notifying the CAO and the DGS.

When the advisor of a student is also the DGS, then any action or approval that is normally required by the DGS will instead be required of the CAO.

There are many helpful books and guides available in the TTIC Library, such as *Mastering Your PhD: Mentors, Leadership, and Community* by Patricia Gosling and Bart Noordam, that give good tips about how to utilize an advisor, get the most out of the relationship, and what to do to be instrumental to an advisor in return.

An advisor will steer a student through the process of determining when research is reaching milestones that indicate it may be thesis proposal and defense time, will work with the thesis committee to determine the thesis' overall quality of research and thesis; scope of the research; extent of novel contribution; significance of research; completeness of thesis (adequate background, literature survey, experiments, etc.); quality of writing; quality of oral presentation, and even provide insight into plotting a course for a career, once their student has achieved their PhD degree.

PhD Candidate Course Unit Requirements

Students are required to take a total of 1200 course units for partial fulfillment of the requirements for the PhD degree. 1000 units are to be completed before Candidacy and a final 200 units during Candidacy.

To fulfill the **Application Requirement** of coursework, at least *one* List B.1 course (100 units) must be completed, receiving a final grade of B- or higher. **This requirement should be completed before submitting a thesis proposal.** *Similar courses taken at another institution will not qualify to fulfill or exempt from this requirement.*

Refer to the courses on **page 17** for eligible List B.1 courses.

All 1200 course units should be completed before a thesis proposal is submitted, meeting the grade requirements listed in the table on **page 27.** A student may petition the Director of Graduate Studies to approve lower grades for courses in list C under special circumstances.

A student may petition the Director of Graduate Studies to approve lower grades for courses in list C under special circumstances. Students may petition course instructors for a grade in some instances, following the Grades Policy. Alternatively, the student may choose to repeat the class.

Teaching Assistant (TA) Requirement

TTIC students are required to TA at least one quarter prior to proposing a thesis. The goal is for the student gain experience in the responsibilities of teaching a course, evaluating students, and other

instruction-related duties. A student may approach a professor or be approached by a professor to TA. Faculty recognize the value of TA'ing and understand that research time may be diminished during a quarter during which you TA.

<u>Giving Notice to Become a TA</u>
Before the beginning of any quarter in which a student will TA, (to fulfill the requirement or not) the student must report the TA position in a ***TA Notice Form***. There is a place on the form to indicate that the student is completing the TA requirement. The notice form informs the Registrar that the requirement will be in effect that quarter. The Director of Graduate Studies will then review the TA position for that particular course, and if approved, the student may proceed.

<u>Courses approved for TA'ing</u>
Students may TA for any TTIC course, and some University of Chicago courses. The Director of Graduate Studies will have final approval for any courses proposed by the student.

<u>Completion of the Requirement</u>
Upon completion of the quarter, and TA duties, the course instructor is sent a ***TA Completion Form*** and the instructor will indicate if the student satisfactorily completed the TA requirement.

A TA has a professional and ethical role in helping provide high quality education. In addition to helping students learn, TAs have an opportunity to be instrumental in igniting students' interest in a field that they love.

Whether a student intends on becoming a professor or not, the skills acquired through TA'ing are helpful outside of the classroom as well. For example, excellent public speaking and presentation skills are critical for presenting at professional conferences or in any public forum. A TA can also learn valuable time and task management skills, how to mentor and supervise others, and how to use technology for presentation purposes. In addition, one of the best ways to truly understand something is to try to teach it to someone else; being successful at it can boost self-confidence as well.

If a student is planning on an academic career, being a successful TA is paramount to that future. Even at a research institution, teaching will be a significant part of a professor's duties. If done well and enjoyed, it can likewise make professional life easier, the work more impactful, and more enjoyable.

TAs are invited to share feedback on their TA experience with TTIC at the end of the quarter. The feedback is analyzed as part of the institute's Program Assessment review.

<u>TA Requirement Restrictions</u>
- If a student wishes to TA a course in which they are enrolled as a student for credit, they must have approval by the Director of Graduate Studies prior to the start of the course.
- A student may not use a course in which they are enrolled for credit, to fulfill the TA Requirement.

<u>FERPA Training for TAs</u>
The Family Educational Rights and Privacy Act (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) is a Federal law that protects the privacy of student education records. Student TAs are required to complete online FERPA training through the Office of the Registrar, which expires every three years. FERPA Training completion records (and dates) are applied to a student's Populi profile page.

Student Talk Requirement

Students of the PhD program gather an intense knowledge base during the program. The Candidacy phase of the program will require students to demonstrate an ability to communicate technical ideas and disseminate their knowledge and findings to fellow students, professors and researchers. To emphasize the value of communication of ideas and knowledge, this requirement has the student exercise their ability to communicate research effectively to a broad audience.

TTIC students are required to give an advertised talk on research work the student has directly been involved in, to a TTIC audience, <u>prior to</u> proposing a thesis. Students may complete this requirement in Pre-Candidacy, or in Candidacy. This may be at a seminar series, a workshop, a conference, or another venue (typically where several faculty will provide feedback) as approved by the DGS. The student is responsible for ensuring the talk will fulfill the requirement by consulting the DGS, ensuring the talk is advertised to the "TTIC Talks" mailing list at least two weeks before the talk date (or providing the alternate advertising evidence), and ensuring an announcement is received by the Registrar so as to record fulfilling the requirement. Talks should be at least 15 minutes in length. The student may report completing this requirement by completing the *Talk Requirement Completion Form* from the Registrar site. The student's advisor will complete an *Advisor Talk Requirement Confirmation Form* online to confirm the talk requirement has satisfactorily been met.

If the talk given was part of the annual Student Workshop event, an event judge who was in attendance may confirm the requirement completion in lieu of the advisor, immediately following the event, also using the *Advisor Talk Requirement Confirmation Form*.

Post Candidacy Timeline and Requirements Chart for PhD Program

Enrollment ⟶

Approved for Candidacy	PhD Candidate Phase	Thesis Proposal *(by end of 4th year)*	Thesis Research	Thesis Defense *(by end of 6th year)*
	200 additional units from List B, B.1 or List C (or from List B, B.1 and C) *Must have B- or better scores.* **Total of 1200 program units altogether.**		Schedule to be determined by student and Research Advisor. Thesis is to be defended within **six years** of initial enrollment in the program.	
	Fulfill Application Requirement *At least 1 course of those taken from List B shall be from List B.1, with a score of B- or higher.*			
	Student Talk Requirement *To be completed in student's first 4 years (before thesis proposal)*			
	Teaching Assistant (TA) Requirement *To be completed before thesis proposal*			

Completion of Degree Requirements

It is expected that full-time students will successfully defend their theses <u>within six years</u> of initial enrollment in the program. To meet this expectation, PhD Candidates are required **to produce an accepted thesis proposal by the end of their fourth year at the Institute.** Any request for an extension may be made by the student and granted at the discretion of the Director of Graduate Studies, and only when there is demonstrated progress toward the completion of the thesis, or when there is evidence that the thesis will be completed in a reasonable amount of time.

Failure to meet program milestones and requirements on time (and with no extension approval) may result in probation or suspension status.

Doctoral Thesis and Defense

The institute requires each student to write a Doctoral Thesis that includes significant original research in computer science. The full Thesis Guide which includes additional policies, a checklist, and timeline for submission are available on the ***Registrar website***.

Thesis Committee
The student's Thesis Committee must consist of at least three faculty members, with at least two TTIC tenured and/or tenure-track faculty. The third, and any further members, may be any TTIC faculty (tenured, tenure-track, research, adjoint or visiting), or University of Chicago faculty. With the specific approval of the Chief Academic Officer, the third and further members may also be faculty or equivalent at another institution. The chair of the Thesis Committee is the student's advisor.

The student must choose their Thesis Committee members and complete the ***Thesis Committee Membership Request Form*** available on the TTIC Intranet. The Registrar keeps this record in the student's file.

A Thesis Committee member's affiliation at the time they become a valid member of the committee shall be considered to remain valid during the thesis process.

Thesis Proposal Defense
The student presents their thesis proposal defense orally to the Committee and the Committee either approves or makes recommendations. The student is expected to provide the Committee with a written thesis proposal as well. The student's proposal is evaluated both orally and on a ***Thesis Proposal Approval Form*** which is provided by the student, completed by the thesis committee, and the committee submits to the Registrar to be placed in the student's file.

Thesis Defense
The student must successfully defend his or her thesis in a public forum before the Thesis Committee and any other interested TTIC community members. The Thesis Committee will decide the format for the defense. An evaluation will be provided to the student both orally and on a ***Thesis Defense Evaluation Form***, by the Thesis Committee subsequent to the defense. The thesis defense must occur at least two weeks after the student has given proper notice. Proper notice consists of the following actions:

- The student must give a draft of the thesis, approved by the advisor, to each member of the Thesis Committee and to the Chief Academic Officer. The draft must be nearly complete with only minor changes expected in the final version.
- The student must put an additional copy on display in a common area designated by the Registrar.
- The student must advertise the time and date of the defense along with an abstract in the appropriate TTIC mailing lists in consultation with the Registrar.

The TTIC Registrar may assist students with securing a room for the defense to be held.

Thesis Publication Requirements

Doctoral theses are original contributions to scholarship. As such, they should be and are made available to the scholarly community at the Institute and elsewhere. As a condition for receipt of the doctorate degree, all doctoral theses produced by students at the Institute are bound and placed in the circulating collections of the Institute Library. They are made available to researchers at the Institute through direct borrowing and copies may be accessed from **arXiv.org**

The thesis should also be made available to other researchers through **arXiv.org.** The digitized full text of the thesis and abstract should be submitted to the site, and a link to the submission provided to the TTIC Registrar.

Because the thesis is published, students should be aware that they must obtain permission from the holder(s) of the copyright(s) to include any copyrighted material in the thesis. The Institute will require documentary evidence that the student has obtained all necessary permissions or has made a good faith effort to do so, if applicable.

Doctoral Thesis Guide

The TTIC Doctoral Thesis Guide thoroughly explains the thesis process, and includes more detail, descriptions and samples, to help students navigate this important set of steps in PhD degree completion.

The Doctoral Thesis Guide may be accessed from the TTIC Registrar website.

PhD Degree Completion

The final date for full thesis submission (compiled as outlined in the Doctoral Thesis Handbook, and signed as accepted by the student's advisor and Thesis Committee) with all requirements met, and no more changes to the text of thesis, in order to participate in the annual autumn diploma ceremony, is **August 31**.

Doctoral Diploma

Once a student has completed all requirements for the PhD Program, they will be notified that they will receive their diploma, and a date will be set for the diploma to be awarded. Diplomas are normally awarded the week preceding autumn quarter of each academic year (late September or early October.)

At the diploma ceremony, those students who have earned doctorate degrees will have a doctoral hood gifted to them on behalf of the institute. Students who finish their degrees at any time during the year are welcome to participate in the autumn diploma ceremony.

A note on forms:
Up-to-date versions of all forms referenced in this Guide may be found on the TTIC Registrar site. You must have a "ttic.edu" login and password to access most of the Registrar site's functionality.