



# **Academic Program Guide**

**2018-19**

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# 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. A number of 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. Alone, not one of the criteria above is 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 educational 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 educational 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. TTIC primarily endeavors to produce PhDs who achieve academic impact throughout their careers. The institute's aims to produce graduates who contribute to society through their intellectual leadership in computer science and information technology. Success in the educational 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 PhD graduates at high-quality research institutions. TTIC also strives to make its PhD students visible to the academic community before graduation. This can be done most effectively through publications prior to graduation.

# 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
- Algorithms & Complexity
- Computer Vision
- Speech Technologies and Natural Language Processing
- 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 Student 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 judged by a student's progress in research as well as their progress in satisfying the formal requirements.

## Academic Calendar

<b>2018 AUTUMN QUARTER</b>	
Registration	Wednesday, September 26
Quarter Begins	Monday, October 1
Thanksgiving	Fourth Thursday and Friday November
Quarter Ends	Friday, December 14

<b>2019 WINTER QUARTER</b>	
Quarter Begins	Monday, January 7
Martin Luther King, Jr. Day	Third Monday in January
Break	Friday, February 15
Quarter Ends	Friday, March 22

<b>2019 SPRING QUARTER</b>	
Quarter Begins	Monday, April 1
Memorial Day	Last Monday in May
Quarter Ends	Friday, June 14

<b>2019 SUMMER QUARTER</b>	
Quarter begins	Monday, June 24
Independence Day	Thursday, July 04
Quarter Ends	Friday, August 30

# 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 maintain 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.

# 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.

<b>Recommended Pre-Requisites</b>	
<b>Subject Name</b>	<b>Detail</b>
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:

Applicants who are international students and have not studied for at least one academic year within the last five years in a school in the United States, the United Kingdom, Ireland, Australia, New Zealand, or an English-medium university in Canada or South Africa, must take the Test of English as a Foreign Language (TOEFL), or the International English Language Testing System (IELTS).

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.

**The minimum TOEFL score to be considered for admission is 92** on the internet-based test (iBT).

**The minimum IELTS score allowed is 7.** Minimum required scores in the IELTS are an overall score of 7, with sub scores of 7 each. (Note: students are required to take the Academic Reading/Writing test within IELTS, not the General Training Reading/Writing test).

English competence, evaluated based on the test scores and an interview with a TTIC representative, is factored into the final admissions decision.

An applicant may be admitted with an English proficiency test score lower than that listed above. The score must still fall within the range listed below:

6.0-6.9 IELTS      61-91 TOEFLiBT      500-579 TOEFL

In such cases, and as terms of acceptance, the applicant must enroll in and complete an English enhancement course from the University of Chicago English Language Institute in the Language Skills or Pronunciation and Conversation Skills course list. This must be completed in the first quarter after enrolling at TTIC. All course expenses and material fees will be covered by TTIC, and a note of attendance/completion must be submitted from the English Language Institute and kept on file in the TTIC Registrar's Office.

Students whose first language is not English may be eligible to enroll in English as a Second Language classes and be partially reimbursed by TTIC. Details of this policy may be found on the TTIC Intranet under 'Student Policies'.

## Advisors

Interim Advisor

Upon entry to the program the Institute assigns each student, in consultation with the student, an interim advisor. Students' admission letters include this assignment.

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 will be the head of the student's thesis committee, and offer guidance regarding research, thesis matters and post-thesis opportunities.

The advisor relationship will be formalized on the [Application for Candidacy](#), with signatures of both the student and advisor(s). 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).

A student may choose to designate as their Research Advisor, a TTIC professor including a Research Assistant Professor, a University of Chicago professor, an adjunct professor, an external professor or researcher (subject to approval by the CAO). In all cases, the arrangement must be documented via signatures by all parties. At all times, the student must maintain a TTIC tenure-track (primary) advisor who formally approves registrations, represents the student at assessment meetings, and can speak on student progress toward degree completion.

### 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.

## **Residency Requirements**

TTIC's degrees are residence degrees in the sense that a major portion of work must be done on campus in the Institute community with the faculty and other graduate students.

The Institute requires the student to be in full-time residence 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.

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 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 20% reduction in stipend 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 any course(s) the student is registered for is cancelled. 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.
- **All But Thesis Status (ABT)-** This status may be accorded to a student whose only remaining requirements are the completion and final defense 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 indicate if they will be in or not in-residence. In-residence students may still receive health insurance and University of Chicago privileges, and are expected to physically be at TTIC. Non-residence students will not receive privileges. Stipend support while on ABT will be determined on a case-by-case basis, dependent upon student progress. It is the student’s responsibility to confirm the details of his or her ABT status privileges. A student may remain in All But Thesis status for a maximum length of four quarters. After four quarters, a student is terminated from the program and must 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.

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 Provisional status, Suspended 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.

The letters will be distributed to each student, along with [Confirmation of Receipt Form](#) that students **must sign and return to Registrar within ten days of letter distribution**. Registration for the next quarter may be restricted until the Confirmation of Receipt form has been returned to the Registrar.

Before the autumn and spring Student Evaluation meetings of faculty, students complete a [Student Data Form](#) indicating progress in the program and in academic performance. These forms make one of the items of data reviewed and evaluated for each student by faculty in the evaluation meeting.

## Grade Policy

### Grade Policy

All core required courses as identified in the PhD curriculum require a letter grade. 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
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Note: TTIC does not formally calculate Grade Point Averages. (This is noted on transcripts.)

The TTIC grade policy in full may be found on the TTIC Intranet under 'Academic Policies.' University of Chicago grade policy may 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. 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 student will receive 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 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 and international students on F1/J1 VISA 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 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.

#### Grade Change Appeal/Request

If a student requests that a course grade be changed after final grades are posted, they may first approach the course's instructor and petition for a grade change, or a performance task that may result in a changed grade (such as an additional project). (Note that only 'letter grade' changes are permissible after a quarter has concluded: grades cannot be updated to a Pass, Fail, Withdraw, Incomplete or Audit after the quarter has finished.) 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.

## Credits

The course unit is the measure of credit at TTIC. An Institute course typically awards 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 semester hours or 5 quarter hours. Candidacy requires 1000 units to be completed, and an additional 200 units are required in Candidacy to obtain the PhD.

Earning a passing grade in a course awards the full unit count for that course.

*Pre-Autumn 2016- Before Autumn 2016, TTIC counted the number of courses. From Autumn 2016, TTIC counts the number of course units, with current courses typically awarding 100 units.*

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.

## 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 ten 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.

# COURSES AND REGISTRATION

## Courses Offered

A list of current and upcoming courses, along with course details and instructor listing is maintained on the TTIC website ([www.ttic.edu/courses](http://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](http://my.uchicago.edu) while registration periods are open.

## Registering for Courses

### Requirements

Each quarter, **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). 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 any courses by the end of Add/Drop (Friday of week 3 of the quarter) 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 in the current or upcoming quarter. 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 must subsequently be approved by advisors.

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](http://classes.uchicago.edu), the University of Chicago student registration system, using their cNet ID.

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/Withdrawals". University of Chicago courses not registered in the **TTIC registration system** by the end of add/drop period may be cancelled 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 15** 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 3 courses from List A, and a total of at least 5 courses 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 charts below.

## Timeline and Requirements Chart for Pre-Candidacy Period

Enrollment

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

<b>List A</b> Core Requirements	<b>List B</b> Depth Electives	<b>List B.1</b> Application Electives
Algorithms <i>TTIC 31010 (100 units)</i>	Computability and Complexity Theory <i>TTIC 31060 (100 units)</i>	Intro to Computer Vision <i>TTIC 31040 (100 units)</i>
Intro to Machine Learning <i>TTIC 31020 (100 units)</i>	Convex Optimization <i>TTIC 31070 (100 units)</i>	Intro to Bioinformatics <i>TTIC 31050 (100 units)</i>
Mathematical Toolkit <i>TTIC 31150 (100 units)</i>	Approximation Algorithms <i>TTIC 31080 (100 units)</i>	Speech Technologies <i>TTIC 31110 (100 units)</i>
	Signals, Systems & Random Processes <i>TTIC 31090 (100 units)</i>	Topics in Bioinformatics <i>TTIC 31160 (100 units)</i>
	Computational and Metric Geometry <i>TTIC 31100 (100 units)</i>	Planning, Learning & Estimation for Robotics and Artificial Intelligence <i>TTIC 31170 (100 units)</i>
	Statistical and Computational Learning Theory <i>TTIC 31120 (100 units)</i>	Natural Language Processing <i>TTIC 31190 (100 units)</i>
	Probabilistic Graphical Models <i>TTIC 31180 (100 units)</i>	Advanced Natural Language Processing <i>TTIC 31210 (100 units)</i>
	Information and Coding Theory <i>TTIC 31200 (100 units)</i>	
	Unsupervised Learning and Data Analysis <i>TTIC 31220 (100 units)</i>	
	Fundamentals of Deep Learning <i>TTIC 31230 (100 units)</i>	
	Introduction to the Theory of Machine Learning <i>TTIC 31250 (100 units)</i>	
<b>List C:</b> 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. <i>Reading classes, pass/fail classes or special topics classes will not generally be approved. (100 units)</i>		
<b>List D:</b> 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 5 courses from Lists A, B and B.1 by 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. 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 related to those submitted for credit approval. If transfer credit is approved, up to 100 units per course is awarded towards the 1000 unit degree requirement. Transfer credit for courses taken elsewhere is decided on a case-by-case basis.

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

Course Credits Transferred (from other institution)	TTIC Courses Prior to Qual. Exam (student must still take)	Adjusted Grade Requirement (for TTIC courses taken)
1	4	One grade below A- is allowed
2	3	All grades must be a minimum of A-
3	2	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 credit shall become transcriptable credit with consent from the instructor.

## 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 applying 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 has the Research at TTIC Seminar Requirement and students are required to register for course "TTIC 31000: Research at TTIC" and attend these seminars their first autumn, winter and spring quarters at TTIC. Students receive a pass/fail grade. 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 seminars (seminars, and TTIC colloquia) 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, prior to 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, prior to proposing a thesis. Students may complete this requirement in Pre-Candidacy, or in Candidacy. Details of the Requirement are in the next section, "Candidacy Requirements." 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 front page of the [Qualifying Exam Form](#) lists specific deadline dates and submission instructions for the student, leading up to the exam date. Qualifying Exam application forms may be 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 2<sup>nd</sup> 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.

The front page of the [Qualifying Exam Form](#) lists specific deadline dates and submission instructions for the student, leading up to the exam date. Qualifying Exam application forms may be found on the Registrar site.

**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 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 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.15), 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:

<b>List A</b>	3 courses	<i>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.</i>
<b>List B or B.1</b>	2 more courses	
<b>List B, B.1, C</b>	200 more units	<i>All 500 units must have passing grades of D or higher. "P" pass qualifies.</i>
<b>List B, B.1, C, D courses</b>	300 more units	
	<b>10 courses/ 1000 units</b>	<i>Passing grade in most courses earns 100 units. (Exception: TTIC 31000 Research at TTIC, TTIC 57000 Computer Science Internship, and Special Topics courses.)</i>

[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. (Required enrollment for F-1 visa holders: CPT internship.)

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 Human Resources. Note that 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 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.

# 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 full timeline reference chart of the PhD Program as a whole may be found on **page 25**.

## 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 15**, 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 after 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 15** 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 25**. A student may petition the Director of Graduate Studies to approve lower grades for courses in list C under special circumstances.

Students who receive grades below A- in courses from list A, B or B.1 may petition course instructors to receive an A equivalent based on extra study, an oral exam, a project, or other arrangements as determined by the instructor. Such an A- equivalent will not replace the original grade in the student's transcript, but will be noted in the student's record and count toward fulfilling the 5-course requirement to apply for the Qualifying Exam. Students should petition the instructor who most recently taught the course. 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 that the student will 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.

### Giving Notice to Become a TA

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.

### Courses approved for TA'ing

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.

### Completion of the Requirement

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 and more enjoyable.

### TA Requirement Restrictions

- 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.


## **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, prior to 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.



## Post Candidacy Timeline and Requirements Chart for PhD Program

Enrollment 

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

## Completion of Degree Requirements

It is expected that full-time students will successfully defend their theses within six years 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 is 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

TTIC has compiled a Doctoral Thesis Guide which 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 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 proceeding 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.