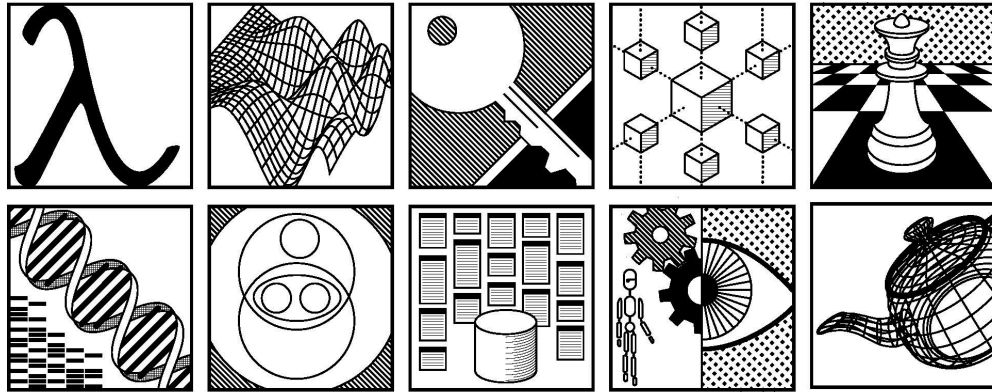


YALE UNIVERSITY



COMPUTER SCIENCE

Graduate Handbook Academic Year 2022-23

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1 Introduction

The purpose of this handbook is to provide students with the details of completing the requirements for graduate degrees in Computer Science at Yale. The Yale Graduate School sets general requirements for all graduate programs under [Degree Requirements](#)¹. The specific requirements for Computer Science are also published by the Graduate School under [Computer Science Program](#)². The information in this document elaborates on and does not supersede the requirements published by the Graduate School.

1.1 Diversity, Equity, and Inclusion

An essential feature of the Graduate program is a commitment to Diversity, Equity, and Inclusion (DEI) consistent with Yale's policies and plans described in [Belonging at Yale](#)³ and plans within the Yale School of Engineering and Applied Sciences [SEAS Commitment to Diversity, Equity, Inclusion, and Belonging](#)⁴. Specifically "The School of Engineering Applied Science (SEAS) at Yale strives to create an inclusive and supportive environment for all members of its community to learn, work, and live our lives together. We acknowledge, welcome, and celebrate our differences, including those related to age, race and ethnicity, gender and gender identity, nationality, immigration status, sexual orientation, religion, disability status, and socioeconomic status." Students are encouraged to consult these university and school level policy and plans and familiarize themselves with the resources provided. Students are also encouraged to contact the Department Chair (Prof. Zhong Shao for 2022-23), the Director of Graduate Studies (Prof. Vladimir Rokhlin for 2022-23), and/or the chair of the Department Committee on Climate and Diversity (Prof. Theodore Kim for 2022-23) with concerns about issues in the department regarding DEI. Specific violations of Yale's policy on discrimination and harrasment should be reported to the [Office of Institutional Equity and Accessibility](#)⁵

1.2 Registration and Deadlines

All graduate students must register each term. For details on registration consult the Graduate School's [Registration & Courses](#)⁶. The Graduate School is scheduled to migrate to a new course registration system during 2022-23, so it is essential to consult the Graduate School site for reliable current information.

The calendar of critical deadlines for all Yale graduate students is available

¹<http://catalog.yale.edu/gsas/policies-regulations/degree-requirements/>

²<http://catalog.yale.edu/gsas/degree-granting-departments-programs/computer-science/>

³<https://belong.yale.edu/>

⁴<https://seas.yale.edu/diversity>

⁵https://cm.maxient.com/reportingform.php?YaleUniv&layout_id=7

⁶<https://gsas.yale.edu/academic-requirements/registration-courses>

at [Graduate School Academic Calendar 2022-2023](#)⁷. Students are responsible for keeping track of deadlines for registration, payments, petitions, and degree milestones. The calendar includes the date for the annual [Commencement](#)⁸.

This handbook describes the specific requirements of and directions for how to progress through computer science graduate programs. Individual questions should be addressed to the Director of Graduate Studies (DGS) or, in the case of MS students, to the Masters Program Adviser (Prof. Holly Rushmeier for 2022-23.)

2 Admissions

Students may apply to the MS or directly to the PhD program. Entry into the PhD program does not require an MS degree. Students in the PhD program will earn an MS (if they start the program without an MS in Computer Science) in the course of successfully fulfilling the requirements for the PhD.

2.1 Schedule

Students are admitted for entrance in the Fall term only. Applications for admission in the fall are available beginning August of the previous year. Information may be obtained from the Yale Graduate School site [Admission to the Graduate School](#).⁹ Application to the Graduate School is an online process only. The Graduate School does not accept faxed or mailed copies of letters of recommendations, transcripts, or other supplemental material. Prospective students can obtain further information by contacting the Graduate School as described in [Yale Graduate School Contact Information](#)¹⁰.

For the Ph.D. application, the deadline for completed applications, including all letters of recommendation and test scores, is December 15, 2022 for study beginning in Fall 2023. For the Master's Programs the deadline is January 2, 2023 for study beginning in Fall 2023. Applicants will be notified of action concerning admission as soon as a decision has been made, generally between February 1 and April 15. Those who are undergraduates at the time of admission must present evidence of having satisfactorily completed the bachelor's degree or its equivalent in order to register in their first term. Those who are in Graduate School must present transcripts giving evidence of satisfactory completion of the current year's work prior to registration. The Graduate School will send reminders to students admitted concerning the deadline for submittal.

⁷<https://gsas.yale.edu/academic-requirements/academic-calendar>

⁸<https://commencement.yale.edu/>

⁹<http://www.yale.edu/graduateschool/admissions>

¹⁰<https://gsas.yale.edu/admissions/contact>

2.2 Application Fee and Waivers

The university requires a non-refundable application fee. Applicants from countries under currency exchange restrictions should seek the help of their state banks or of friends already in the United States for payment of this fee. Applicants may have the fee waived if they are members of a variety of professional organizations (NSBE, SACNAS, SWE, AISES) or have attended a qualifying conference in the past (Grace Hopper, Tapia, AfroTech). A complete list of qualifying organizations and conferences, as well as the fee waiver form, can be found at the Yale Graduate School's page on [Application Fees & Fee Waivers](#)¹¹.

2.3 GRE Requirements

Master's program applicants should arrange to take the GRE no later than October testing. The doctoral program no longer requires the GRE. The results of later testing are usually not available before admissions decisions are made. Remember that ETS will report scores only by mail and only at the written request of the student. Address inquiries to [ETS](#)¹²

2.4 English Language Requirement

The Graduate School has English language test requirement for non-native English speakers. The required test and exemptions from the test are explained in [Standardized Testing Requirements](#)¹³.

3 Masters Programs

There are two Masters programs offered by the department. One is a one year (two semester) courses-only program, and one is a two year (four semester) program with teaching responsibilities and a thesis. The first year offering of the two year program will be the academic year 2023-24.

The Masters programs are sometimes referred to as "terminal" programs, meaning only that normally students leave academia after completing the degree (and so "terminating" their time at the university.) Students who develop an interest in continuing into the PhD program from the MS program must go through the standard PhD application and admission process. There is no procedure to automatically transfer MS students into the PhD program.

All candidates must submit a degree petition for approval to the registrar in the term in which they expect to graduate. The forms can be found at available from

¹¹<https://gsas.yale.edu/admissions/phdmasters-application-process/application-fees-fee-waivers>

¹²<https://www.ets.org/contact>

¹³<https://gsas.yale.edu/admissions/phdmasters-application-process/standardized-testing-requirements>

the [Office of the Registrar Forms & Petitions](#)¹⁴ and the deadlines for the petitions are listed at [Graduate School Academic Calendar 2022-2023](#)¹⁵.

3.1 Common Course Requirements

Both MS programs require a significant amount of coursework. Courses at Yale are listed by the university Registrar at [Yale Course Search](#)¹⁶. Courses in the Graduate School are either graded on a scale (in descending order) H (Honors), HP (High Pass), P (Pass), and F (Fail), or on the basis of SAT (Satisfactory) / UNSAT (Unsatisfactory).

In addition to the required courses (eight for the one year program, six for the two year program), all MS students must take CPSC 990, “Ethical Conduct of Research,” in their first semester and pass it with a grade of SAT. CPSC 990 does not count towards the required number of courses for the degree and does not count towards the number of courses required for full time study.

Each term each student meets with the MS adviser (Prof. Holly Rushmeier in 2022-23) to discuss the courses they plan to take. The courses approved for the MS degrees include any 500-level course in the Computer Science department. Some 600-, 700-, or 800-level courses in the Computer Science department are also approved if they involve regular meetings with a faculty member, require written work that can be evaluated, and result in a regular grade of P, HP or H. A student must confirm with the MS adviser at the time they register for a 600-, 700-, or 800-level course to be sure that the course will count towards the MS degree. Typically, most 600-level courses do count, but 700- and 800-level courses count only with explicit approval from the M.S. adviser at the time of registration.

A few graduate courses in other departments in the Graduate School of Arts and Sciences that have significant content related to computer science AND which require an intermediate level course as a prerequisite have been approved for the MS degrees. An intermediate level course is defined as one that requires an introductory course as prerequisite. A list of courses from departments outside of Computer Science that are approved for the MS will be distributed to students in the MS programs by the MS adviser each semester.

No more than three non-computer science courses can be counted towards the MS degree.

3.2 One Year MS Program

The one year program is the most common terminal MS degree in Yale Computer Science.

¹⁴<https://registrar.yale.edu/forms-petitions>

¹⁵<https://gsas.yale.edu/academic-requirements/academic-calendar>

¹⁶<https://courses.yale.edu/>

3.2.1 Course Requirements

In the one year Master of Science (MS) program, a student must pass eight courses from an approved list of courses (as described in section 3.1) with a grade average of HP and with at least one grade of H. A student in the one year MS program on a visa must take a full course load of four courses per semester that count towards the MS requirements. (As noted in section 3.1 CPSC 990 is required but does not count towards the four course requirement.) A student who does not require a visa may study part time and complete the degree over a period of up to four years.

CPSC 692, a one-term independent project course, may also count towards the eight course requirement provided that the M.S. adviser approves and a faculty member is willing to supervise the project applying the same standards as for a PhD student project. The faculty members are under no obligation to supervise independent projects for MS students.

3.2.2 Financial Support

There is no commitment to provide financial assistance to students in the one-year MS program. Occasionally there are teaching fellow positions available for one-year MS students. For students studying full time, because of the time commitment required for teaching, such positions are generally reserved for students in their second term who have established a strong academic record at Yale. Standard 10 hour teaching fellow (TF) positions are paid a small stipend, but do not cover the cost of tuition.

3.2.3 Third Term

Students on a visa who complete the eight courses required for the M.S. in two terms may apply for an additional third term of study as a visiting student. Directions for applying as a visiting student are given by the Graduate School in [Visiting Students](#).¹⁷ Note that for students on a visa, CPT (curricular practical training) is not available for the time between the second and third terms.

3.3 Two Year MS Program

In the two-year MS program a student must pass six courses from an approved list of courses with a grade average of HP and with at least one grade of H, serve as a 20 hour per week Teaching Fellow for all four terms, and complete a research thesis. Typically a very small number of students will be accepted into the two-year program.

While there is no process to automatically transfer into the PhD program, students who successfully complete the two-year program with thesis will be eligible for

¹⁷<https://gsas.yale.edu/admissions/non-degree-application-process/visiting-students>

consideration for admission with acceleration to the Computer Science Department doctoral program. If admitted to the doctoral program, the student will be allowed to count the six courses taken in the MS program towards their course requirements in the doctoral program. They would also be able to substitute their MS thesis for the CPSC 690/691 requirement (see 4.2.1.) They would have no further teaching requirement in the doctoral program. The student would be required to take at least two additional courses (possibly more if needed to satisfy the distribution and depth requirements, see 4.1.1) and to complete the other milestones for candidacy in the Ph.D. program.

3.3.1 Year One

In the first year of the two-year program the student must take two courses from the list of approved courses (see section 3.1) each term. The student must also serve as a 20 hour per week Teaching Fellow each term (see 3.3.3.) The combination of the two courses and the teaching requirement is defined as full time study in the two-year program.

In the first year the student should also identify an adviser for their second year thesis project. They should do this by reviewing faculty web pages, attending department seminars and thesis defenses, and consulting with the MS adviser.

3.3.2 Year Two

In the second year of the two-year program the student must take one course from the list of approved courses each term. The student must continue to serve as a 20 hour per week TF each term. The student must complete a research thesis (see section 3.3.4). In the event that the student fails to be accepted by a thesis adviser by the beginning of the second year they may complete the MS degree by taking two approved courses in each term instead of one.

3.3.3 Teaching Requirement

The Graduate School publishes general information on serving as a TF in [Teaching Fellows Requirements](#)¹⁸.

English Language Proficiency is required to serve as a Teaching Fellow. Consult [English Language Proficiency Pathways](#)¹⁹ for information on proficiency. Students are required to document proficiency in their application materials in order to be accepted into the two-year program. Methods to document proficiency are given in [English Language Proficiency Pathways](#)²⁰.

¹⁸<https://gsas.yale.edu/academic-requirements/teaching-fellows-requirements>

¹⁹<https://cls.yale.edu/programs/english-language-program/english-language-proficiency-pathways>

²⁰<https://cls.yale.edu/programs/english-language-program/english-language-proficiency-pathways>

Before the first term teaching, students are required to participate in "Teaching At Yale" training provided by the [Yale Poorvu Center](#).²¹ The Center will send out the schedule for the training that typically is conducted just before the start of fall term. Students serving as teaching fellows are urged to participate in additional training opportunities offered by the Poorvu Center.

Additionally, before their first teaching assignment students should read [Best Practices for Inclusive Teaching in Yale](#)²². This document provides information about Yale regulations and Yale specific terms as well as guidance for inclusive teaching.

3.3.4 Thesis Requirement

Students in the two-year MS program must submit a thesis presenting original research at the end of the second year. This research is performed under the direction of a faculty adviser identified during the first year of study. In addition to submitting the thesis, the student must orally present the work in a seminar open to the computer science department.

3.3.5 Financial Support

In return for serving as a 20 hour per week TF each term, students in the two-year program receive a full tuition fellowship from the university. They also receive a small stipend each term.

4 Doctoral Program

Typically the doctoral program in Computer Science takes five to six years to complete, but the actual time depends on the individual student and their research. The minimum time of three years in residence in New Haven for the doctoral degree is specified by Graduate School general requirements.

Students must complete the requirements for admission to candidacy by the end of their third year. There are specific milestones to be completed for candidacy are summarized in Table 1. The completion of these milestones satisfies the "Special Requirements for the PhD Degree" described by the Graduate School's description of the program. Here we describe the program and how to complete the milestones year by year.

²¹<https://poorvucenter.yale.edu/>

²²https://seas.yale.edu/sites/default/files/imce/other/diversity/Best%20Practices%20For%20Inclusive%20Teaching%20%20in%20Yale%20Computer%20Science-09-15_2021.pdf

Milestone	Year Completed
Accepted by Adviser	Year 1
Ethical Conduct of Research Course	Year 1
Ten Courses	Years 1 and 2
CPSC 690 Research Project	Year 2
Serve as Teaching Fellow	Year 2 or 3
Area Exam	Year 2
Dissertation Prospectus	Year 3

Table 1: Milestones for Candidacy in the Computer Science Doctoral Program.

4.1 Year One

A student is expected to take courses and familiarize themselves with the research activities underway in the Department. By the end of spring semester of the first year, the student must have teamed up with a research adviser, i.e., a faculty member with a primary appointment in Computer Science who takes responsibility for the student's progress. Hence, every student should begin discussion with a professor (or professors) whom they might want to work with early in their first year (or even before they arrive) in order to identify an adviser.

In special cases students may qualify for an accelerated program known as the "Fast Track" in Year One (see Sec. 4.1.3.)

To remain in good standing at the end of the first year a student must successfully complete a substantial percentage of the required coursework and must have an adviser who has agreed to work with them.

4.1.1 Coursework

This section elaborates on the first two elements of the "Special Requirements" for Computer Science as specified by the Graduate School: "(1) pass ten courses (including CPSC 690 and CPSC 691) with at least two grades of Honors, the remainder at least High Pass, including three advanced courses in an area of specialization; (2) take six advanced courses in areas of general computer science;"

Courses at Yale are listed by the university Registrar at [Yale Course Search](https://courses.yale.edu/)²³. Courses in the Graduate School are either graded on a scale (in descending order) H (Honors), HP (High Pass), P (Pass), and F (Fail), or on the basis of SAT (Satisfactory) / UNSAT (Unsatisfactory).

CPSC 991, "Ethical Conduct of Research," must be taken in the fall semester of the first year in the PhD program and passed with a grade of SAT.

All students must successfully complete ten courses, where "successful" is defined as receiving an H or HP, or in the special case of the required course CPSC 690, a grade of SAT. Courses completed with a grade of P do not satisfy the course requirement. The course CPSC 991 *does not* count as one of the ten courses.

²³<https://courses.yale.edu/>

Specifically:

- Two of the courses must be CPSC 690 and CPSC 691, which are research courses described in Year Two.
- CPSC 690 must be passed with a grade of SAT and CPSC 691 must be passed with a grade of H or HP.
- Two of the remaining courses must be passed with a grade of H; the rest must be passed with a grade of at least HP.
- In order to satisfy the program's depth requirement, each student must successfully complete three advanced courses in a particular field by the end of their second year.
- In order to satisfy the program's breadth requirement, each student must successfully complete courses across a distribution of topics in computer science.

There are general and distribution constraints that govern which courses may be counted towards the course requirements:

General constraints

- No course with number 499 or below can be used to satisfy a course requirement.
- Any 500-level course can be used to satisfy both the 10-course requirement and the depth requirement. For example, if a theory student takes a 500-level theory course, it simultaneously counts toward both the 10-course requirement and the depth requirement.
- The CPSC 690 and CPSC 691 course sequence counts only toward the 10-course and research requirements (i.e. not depth or distribution requirements.)
- A 600-, 700-, or 800-level course may count toward the 10-course and depth requirements if it involves regular meetings with a faculty member, requires written work that can be evaluated, and results in a regular grade of H or HP. A student should check with the DGS at the time they register for a 600-, 700-, or 800-level course in order to be sure that the course will count toward the 10-course, distribution, and/or depth requirement. Typically, most 600-level courses do count, but 700- and 800-level courses count only with explicit DGS approval at the time of registration.
- Non-CS Department courses: A student can count graduate-level courses outside the Department towards the 10-course and depth requirements if they are relevant to the student's program of study. The decision about whether a non-CS course satisfies a requirement is made by the DGS, possibly in consultation with the student's adviser.

Distribution constraints

Two of the ten courses must be in “theoretical computer science,” two must be in “programming languages and systems,” two must be in “applications.” At least one course taken at Yale must be a Computer Science course designated as “programming-intensive,” with a workload whose goal is to produce several thousand lines of code at a high level of proficiency. The courses in each of these categories currently (as of August 2022) are:

Theoretical Courses: 555, 557, 560, 561, 562, 563, 564, 565, 567, 568, 569, 662, and 667, 668.

Programming Languages and Systems: 513, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 533, 534, 535, 536, 537, 538, 539, 547, 554, 559, 625, 638, 639, and 647.

Applications: 510, 511, 512, 531, 532, 540, 545, 546, 547, 551, 552, 553, 558, 559, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 581, 582, 583, 584, 640, 672, 676, 678, 679, 745, and 752.

Programming-Intensive: 520, 521, 522, 524, 525, 526, 527, 539, 573, 578, 579, 625, and 639.

New courses are frequently added to the offerings in the department. A student should check with the DGS if they have questions about whether a Computer Science course not mentioned in the previous two paragraphs satisfies a particular requirement. Exceptions to these requirements and constraints may be made by the DGS.

Other Considerations

All the courses must contain substantial material beyond what the student has learned before coming to Yale. If a student is unable to find courses satisfying the requirements above, the DGS may accept courses from other departments that are in similar topic areas. Seminars may be acceptable too, in some cases. These are courses, usually 700-level, presented on an ad-hoc basis that may consist mainly of paper presentation and discussion. The DGS will approve such a course to satisfy the distribution requirement if a student has already studied deeply in a research area and is strongly motivated to explore it further.

Students having difficulty successfully completing at least half of their course requirements in the first year may not be considered in good standing, and may be required to leave the program. Depending on the specific circumstances and after consultation with the student’s adviser such students will receive a probationary letter from the DGS.

4.1.2 Selecting An Adviser

This section elaborates on the fifth element of “Special Requirements” for Computer Science as specified by the Graduate School: “(5) be accepted as a thesis student by a regular department faculty member;”. By the end of the first year a student **must** be accepted by an adviser to remain in good standing. Each term the DGS will require faculty members to confirm the names of students they have accepted

for advising. The DGS will notify students whom no faculty member has accepted. Students who have not been accepted by an adviser by the end of the first year will be required to leave the PhD program.

Advisers must be a faculty member with a primary appointment in Computer Science. These faculty members are listed under [Computer Science Faculty](#)²⁴. In some cases students may be interested in working with faculty whose primary appointment is in some other department at Yale but who also have an official secondary appointment in CS. [Secondarily Appointed Faculty](#)²⁵. In these cases a student must still have a faculty with primary appointment in CS who agrees to serve as the "adviser of record."

Typically students are assigned an adviser at the beginning of Year One. This assignment is based on research interests expressed by both the student and the faculty member during the application and admissions process. Often the student begins to work with the assigned faculty member in identifying research topics.

It is sometimes the case that the initial adviser assignment is not a good match for the student. In this case the student should explore opportunities with other faculty in the department. Methods to learn about research opportunities include:

- Review the web pages of all faculty members in the area of the student's interest.
- Take courses in topics of interest and actively participate in class.
- Attend department seminars, dissertation defenses, and special presentations in CPSC 991.

Students should contact faculty members that they are interested in working with and schedule an appointment to discuss possibilities. On one hand many faculty members have funded projects that they are eager to recruit students to work on. On the other hand, some faculty members may not have the resources (time and funding) to take on new students. Multiple appointments and discussions may be necessary to find a good match.

Students in Year One should spend a substantial amount of time either working to start their research with their assigned adviser or on finding a new adviser who agrees to supervise their research. Students should meet with their initially assigned adviser regularly (e.g. weekly) in their first term. At the end of the first term advisers will confirm the names of the first year students they are officially advising. First year students without an adviser at the end of the first term will receive a probationary letter requiring the student to find an adviser by the end of the first year or leave the program.

²⁴<https://cpsc.yale.edu/people/faculty>

²⁵<https://cpsc.yale.edu/people/secondarily-appointed-faculty>

4.1.3 The Fast Track

Fast-track status enables students whose computer science education is already well under way when they enter the PhD program (e.g., after receiving a master's degree in CS from another institution) to take fewer courses and to get started sooner on research. A student who wants to get onto the fast track must discuss the issue with the DGS upon admission to the program. The status becomes official if, by the end of the first year of study, 1. the student has taken CPSC690 (i.e., found an adviser and begun research) and 2. successfully completed six courses with grades of HP or H. (including 691)

The DGS will examine the student's academic history to decide which courses already taken satisfy which distribution requirements, and which requirements remain to be satisfied. Students who expect to qualify for the "fast track" may, with permission of the DGS, begin the 690 project in the first or second term of study. A student may also be granted permission to begin the 690 project in the first or second term if their intended area examination covers work done for the 690 project (which is now the case in programming languages and systems). Such an early start on research will not affect the eventual attainment of fast-track status; nor will it affect the number of courses that are eventually waived; both of those decisions are made by the DGS as described above.

Here in detail is the procedure that is now required to certify that a student is taking the fast track: A table must be prepared showing which Yale courses are obviated by which graduate-numbered courses at the institution where the student earned their MS. All of these courses must have been taken during the student's post-graduate education, after the award of a bachelor's degree or equivalent. A theory course here must be paired with a theory course there, and so forth. However, the titles of the two courses do not have to be identical, or even similar, provided that, in the judgment of the DGS, the two courses occupy the same "ecological niche." That is, if Yale offered a course on that topic, it would be classified as a course that satisfied the same clause of the distribution requirement as the Yale course it is paired with. (Example: Suppose Yale offers a course on distributed sensor networks, and the MS institution offers a course on mobile computing. These can be paired, because, if Yale had a course on mobile computing, it would satisfy the same systems requirement as the "distributed sensor networks course.") The student must fill the course waiver form and obtain the signature of their adviser. The DGS approves the certificate incorporating this table and sends it to the Dean of the Graduate School, who must approve waiving the courses proposed by the Department of Computer Science. No more than three courses may be waived as part of the fast-track program.

4.2 Year Two

In Year Two the student continues taking courses (including CPSC 690 and CPSC 691), serves as a Teaching Fellow, and must pass an Area Exam. This section elaborates on these activities which satisfy the third fourth and sixth elements of

the Graduate School's "Special Requirements for the PhD Degree": "(3) successfully complete a research project in CPSC 690, CPSC 691, and submit a written report on it to the faculty; (4) pass a qualifying examination in an area of specialization; (6) serve as a teaching assistant for two terms"

4.2.1 CPSC 690 and 691

In the CPSC 690 and CPSC 691 sequence, the student carries out a research project and writes a report on the results; These are known as the "690 project" and the "690 report." The work is done under the direction of the student's adviser. When registering for 690 and 691 the student should enter the name of their adviser at that time.

The student must submit a written report on their 690 project to their supervisory committee (the committee and its role is further described in Section 4.2.4); the committee members grade the report, taking into account the quality of the work, the quality of the technical writing, and the level of English proficiency. The grade and a one-page abstract must be transmitted to the DGS. Note that the course grades for CPSC 690 and CPSC 691 are not the same as the grade on the 690 report. The adviser files a grade of "SAT" for CPSC 690 and a grade of H or HP for CPSC 691 if the student is making satisfactory progress toward completing the research and the report. If the student is not making satisfactory progress, for a grade of "UNSAT" for CPSC 690 or below HP for CPSC 691, the adviser must notify the supervisory committee and the DGS. The course grade is submitted at the end of the term, with other course grades. The grade on the 690 report is submitted after the supervisory committee has read it and agreed on a grade, which may occur before or after the course grade is submitted.

4.2.2 Area Exam

The purpose of the area exam is to demonstrate scholarly proficiency in a subject area that includes the topic of the student's 690 project but is broader. The exam is formulated and administered by the student's supervisory committee (the committee and its role is further described in Section 4.2.4) The committee must decide whether to give the same exam simultaneously to a cohort of students in the same area or to give a customized exam to each student in the area. The adviser should email the DGS and the registrar in the department to record when the student has passed the exam.

The Computer Science area exam meets the general requirement of the Qualification Exam set forth by the graduate school.

4.2.3 Teaching Requirement

Each student must serve as a teaching fellow (TF) for two terms; this is a key part of academic training. First-year students are not normally eligible to serve as TFs;

thus, this requirement typically becomes relevant in the second year. However, it is not necessary for the student to satisfy the teaching fellow requirement entirely in their second year.

Assignments for students fulfilling their required teaching assignments are given priority and must be hired in the Teaching Fellow System before any other assignments can be made. The Graduate School publishes a list of [Teaching Fellows Requirements](#)²⁶.

English Language Proficiency is required to serve as a Teaching Fellow. Consult [English Language Proficiency Pathways](#)²⁷ for information on proficiency. The English Language Program (ELP) at the Center for Language Study provides a summer intensive for new PhD students who require assistance. A test will be administered at the end of the summer program. If a student does not pass, they will be required to enroll in a course as instructed by the ELP.

Before completing the requirements for language proficiency, PhD students may serve as a grader/no contact and will not hold office hours. Grader/contact assignments do not count toward the 2-term requirement of teaching. If a student chooses not to fulfill the teaching requirement in the first term of eligibility, they need to notify the department registrar right away. School deadlines require an efficient handling of all required assignments.

Before the first term teaching, students are required to participate in "Teaching At Yale" training provided by the [Yale Poorvu Center](#).²⁸ The Center will send out the schedule for the training that typically is conducted just before the start of fall term. Students serving a teaching fellows are urged to participate in additional training opportunities offered by the Poorvu Center.

Additionally, before the first teaching assignment students should read [Best Practices for Inclusive Teaching in Yale](#)²⁹. This document provides information about Yale regulations and Yale specific terms as well as guidance for inclusive teaching.

Students interested in pursuing positions at teaching-oriented universities after completing their degree should work with their adviser to determine which courses will give them wide exposure to undergraduate instruction.

4.2.4 Evaluation of Progress

After the first year, the student comes under the direction of a supervisory committee, consisting of the adviser and two or three other faculty members who monitor and mentor the student. Usually the committee forms "automatically" and consists of faculty working in the same area as the adviser, but there are many exceptions,

²⁶<https://gsas.yale.edu/academic-requirements/teaching-fellows-requirements>

²⁷<https://cls.yale.edu/programs/english-language-program/english-language-proficiency-pathways>

²⁸<https://poorvucenter.yale.edu/>

²⁹https://seas.yale.edu/sites/default/files/imce/other/diversity/Best%20Practices%20For%20Inclusive%20Teaching%20%20in%20Yale%20Computer%20Science-09-15_2021.pdf

especially when the student's work crosses disciplinary or departmental boundaries. In particular, if the day-to-day adviser's primary appointment is not in the Department of Computer Science, the committee must contain the "adviser of record" whose primary appointment is in CS. Once a student has selected a supervisory committee, changes to the committee require consultation among the director of graduate studies (DGS), the old committee, and the proposed new one. In rare cases, such changes may require the approval of the entire faculty

Progress is monitored by the student's supervisory committee. The committee looks at grade records, exam results, the 690 report, and research progress. Students beyond the first year receive written annual evaluations of their progress, drafted by the supervisory committee. Copies of evaluations are placed in the student's file. A decision that the student is not making satisfactory progress toward the PhD may be made at any time by the supervisory committee.

For students not in good standing (failing to achieve required milestones or by recommendation of their supervisory committee):

- The student and the faculty will be notified. All information regarding the student, including course grades, research performance, and performance on exams, will be made available to the faculty as a whole and a course of action will be determined for the student. Possibilities at this stage can include continuation in the program with revised expectations, academic probation, or dismissal from the graduate program.
- The DGS will inform the student in writing of the faculty's determination and, if continuation in the program is permitted, conditions that must be met in order to return to good standing will be outlined.
- If the reason for the student's trouble is inability to do research under the supervision of their current committee, a new committee can be formed and an appropriate period of time is given to the student (e.g., a term or a summer) to demonstrate ability to conduct a research project successfully. The new committee will report to the faculty at the end of this period so that a decision can be made about whether the student has returned to good standing.
- If a supervisory committee determines that a student has not met one or more of their requirements, it should report that determination to the faculty and make a recommendation about how to proceed. A recommendation may range from termination, probation, a specific project assigned for completion under the direction of a specific faculty member, or change of adviser.

Subsequently, the committee should continue to monitor the student's progress and to make recommendations to the faculty about how to proceed. A committee may recommend that the student change their area of research and proceed under the direction of a new supervisory committee. This recommendation is not routine and should not be considered the normal consequence of failing an area exam.

If the problem is corrected in a timely fashion, the committee will eventually recommend the student (having met all pre-dissertation requirements) for admittance to candidacy.

The supervisory committee's evaluation is particularly crucial at the end of the second year, when the results of the 690 project and area exam become available. At this time, the supervisory committee is expected to report in writing to the faculty as a whole (as well as to the student) on the student's status. This notification should be given by the middle of May, so that a faculty meeting can be held before the end of May to act on any recommendations.

4.3 Year Three

The third year is focused on research and preparing the dissertation prospectus. This section elaborates on the final element of the requirements published by the Graduate School: "(7) submit a written dissertation prospectus, with a tentative title for the dissertation. "

After successful completion of the Year Two milestones, the student will have completed the requirements for an "en route" MS degree. If they have not already received an MS in Computer Science the student may file a petition to receive this degree in the first term of their third year.

In Year Three the student is expected to begin their dissertation research, usually under the direction of the same supervisory committee but committee membership can be changed at this point, in view of the direction that the student's research has taken during their second year. If the student or the original supervisory committee believes that the research is not going well, this is a good time to find a new adviser, a new supervisory committee, and/or a new research topic. Students should notify the DGS of any difficulties they meet during their work with an adviser. The departmental registrar and the DGS must be notified in writing via email of the pending changes and any circumstances that led to the difficulties.

Completion and passing of a qualifying (area) exam (if for some reason area changed or exam needs to be re-taken after Year Two) along with submittal of a dissertation thesis prospectus are both due by the conclusion of the spring term of the third year in the doctoral program. If they are working on these milestones and not taking courses at the same time, students should register under CAND999.

4.3.1 The Prospectus

A thesis prospectus must be filed with the DGS and the Graduate School by the end of the spring term of the student's third year in the program. The prospectus is a written summary (usually about three or four pages long) of the nature and scope of the research, along with a tentative title of the dissertation. The prospectus must also include a proposed committee of readers (see 4.4.4) and be signed by the adviser. Note that the spring term ends in May. The exact date on which the term ends in any particular year can be found on the Graduate School calendar.

4.3.2 Admission to Candidacy

The prospectus is usually the last piece to fall into place, and it must be done before the thesis committee votes on admission to candidacy. The Graduate Administrative Dean will inquire about students who have not been admitted to candidacy starting in the beginning of their fourth year. If the student has not been admitted to candidacy by the end of the third year, the Graduate School will not allow the student to register for classes at the beginning of their fourth year or to be paid as a research assistant or TF.

Correcting this registration problem requires the Computer Science Department to negotiate with the Graduate School; negotiation usually results in the student's being placed on probation for a term with the expressed intention of all concerned that they will be admitted to candidacy before the end of that term. The possibility of probation for one term should not be interpreted to mean that the "real" deadline for completion of requirements is August 31 of the year in question. Rather, as explained above, the spring term ends in May. The exact date on which the term ends in any particular year can be found in the Graduate School calendar; it is this end-of-term date this is the deadline for admission to candidacy.

The requirements for the Master of Philosophy (M.Phil.) degree are the same as for the PhD except for requirements having to do with the dissertation and teaching. Therefore, once admitted to candidacy the student has satisfied the requirements for the M.Phil. The M.Phil. will be auto-petitioned by the university registrar after a student is admitted to candidacy. All petitions can be submitted to the registrar in the term after all requirements have been met.

4.4 Year Four and After

The Graduate School will not allow a student to register for a fourth year of study until they are admitted to candidacy. After admission to candidacy, the student's position in the Department is secure, subject only to continued satisfactory progress toward completion of the dissertation. After achieving candidacy, students should register for DISR999 each term. When the dissertation is complete, it is defended before the faculty and approved by a committee of readers. It is turned into the Graduate School, and the readers file reports approving it. At this point, the DGS will approve the degree, so far as the department is concerned. In the unlikely event that the DGS fails to approve the degree, the subsequent course of action will be decided by the Department Chair, on a case-by-case basis. At that time the requirements for the PhD have been met, and the degree is granted.

Many students find it useful to do internships to further their research (see Section 4.7.) The Department is highly supportive of internships. International students should consult OISS for applying for CPT (rather than OPT) for internships.

4.4.1 The Dissertation

Each year a doctoral candidate works on their dissertation, an annual dissertation report must be filed and approved by their adviser. This is submitted at [Dissertation Progress Reporting and Submission, VPN required](#).³⁰ This site becomes available to the student after their admission to candidacy. A notice will be sent asking for submission of the first annual report in April of each year. The adviser is notified upon submission, must review the report, and approve it or request more detail. After adviser approval, the DGS is notified of the report and must all review the report and provide approval.

The most important part of the PhD program is research training, culminating in the writing of a dissertation. The dissertation should be concluded no later than the end of the student's sixth year. The dissertation demonstrates the student's ability to perform original research. Thus, it must demonstrate technical mastery of the subject and must contain conclusions that modify or enlarge what has previously been known. Because Yale is a research university dedicated to the dissemination of knowledge, all results of research, including the dissertation, must be made public. Access may not be restricted for any reason, commercial or governmental.

4.4.2 Thesis Defense

The student must give an oral defense of the research when their committee is satisfied that the work is finished, and a complete draft of the dissertation has been written. At least one week before the defense, the dissertation draft must be placed on the web, and the faculty must be notified that it is available. If the student or the adviser does not want the draft to be publicly accessible, it can be placed on the Department's website in the "Internal CS Only" section (on the "Faculty Use Only" page.)

The defense consists of a one-hour presentation of the results followed by a 15-minute question and discussion period, both of which are open to the entire department and its guests. The committee of readers (see section 4.4.4) and any other faculty members who wish to participate then conduct an oral examination in closed session. At least three readers must be present at the defense, but "presence" may be achieved technologically, e.g., by teleconference or Zoom. It is not necessary for the external reader to attend the defense.

While it is not required, it is recommended that students do a mock-up "pre-defense" with their committee three to six months before their actual defense. This can help identify any issues in their dissertation and avoid last minute issues when the student is planning to finish.

The defense must be scheduled by the student and adviser in consultation with the DGS and the business office, announced one month in advance, and re-announced one week in advance. This requirement is strictly enforced. The announcement must be sent by email to the entire department and must include

³⁰<https://dissertation.yale.edu/dprs/>

the date, time, and location of the defense, the student's name, the title of the dissertation, a one-paragraph abstract, and the names of the student's adviser and committee members. At the conclusion of the defense, the student must submit a Computer Science Defense Form, signed by all committee members to document completion. The signed form should be emailed to the department registrar for filing.

4.4.3 Dissertation Submission

The dissertation must be submitted to the Graduate School after the thesis defense has been passed and final corrections to the dissertation draft have been made. The Graduate School requires that the dissertation be submitted by October 1 for a December degree and by March 15 for a May degree, and these deadlines are strictly enforced. Thus, the dissertation must be submitted after the student completes the defense and final corrections and on or before the Graduate School's deadline for the degree; exactly when in this interval a particular student should submit their dissertation to the Graduate School depends on which term is the last in which they will register as a PhD student. The submission date should be determined by the student and the adviser in consultation with the DGS at the time that the defense is scheduled. After the dissertation is submitted, copies are sent to the readers, each of whom reads the dissertation and completes a "reader's report" form. When all readers' reports are in, the DGS will approve the degree, so far as the department is concerned. In the unlikely event that the DGS fails to approve the degree, the subsequent course of action will be decided by the Department Chair, on a case-by-case basis. The dissertation process of submission is handled entirely online starting with the listing of readers.

If you have questions about submitting your degree petition and the dissertation, email the Dissertation Office at dissertationreaders@yale.edu or call tel:+1(203)432-0461.

4.4.4 Dissertation Readers

The dissertation must be read by a committee of four readers, which is a distinct entity from the supervisory committee (although it normally overlaps with it). Three readers must be internal (Yale University), and one must be external (another university or research lab). An internal reader may be any faculty-level person with a close affiliation to the Yale Department of Computer Science, including regular faculty, visiting faculty, research scientists, and associate research scientists. An external reader may be any qualified person who is not closely affiliated with the Computer Science Department. In addition, at least two internal readers must be regular ladder faculty in the Yale Computer Science Department (this can include the thesis adviser.) Before submitting the final dissertation to the Graduate School, be sure your readers have been submitted online at the [DPR³¹](https://dissertation.yale.edu/dprs/) site. If your adviser

³¹<https://dissertation.yale.edu/dprs/>

is one of your dissertation readers, their name must be submitted as the adviser and reader separately. Your readers will have thirty days to read and submit a report upon receipt of your dissertation.

Exceptions to these rules require approval of the DGS. For the purposes of these rules, “close affiliation” status is conferred by any extended visit in the Department or any kind of departmental appointment or title, including affiliate and adjunct titles. Occasional short-term visits or research collaborations do not constitute close affiliation. Once conferred, the status of “close affiliation” persists for a period of two years after the affiliation terminates. Thus, a Yale CS-faculty member who takes a position elsewhere may continue to serve as an internal reader for two years after leaving and may not serve as an external reader during that same period. The above notwithstanding, the reading committee must always include at least one current regular ladder faculty member in the Yale Department of Computer Science. In addition, if the adviser leaves Yale, the Graduate School may require that a current Yale faculty member serve as acting adviser. The rules concerning the composition of the reading committee must be satisfied when the committee is first formed, at the time of the thesis defense, and at any time that the committee is changed. Enter the name of your readers in the Dissertation Reader Report system.

4.5 Financial Support

The department will provide financial support to doctoral students in good standing for at least the first five years of study. After the first year, students often receive research assistantships in their field of specialization or other forms of support. These may also be supplemented by teaching fellowships. The standard teaching fellowship in this department is at the level of a TF-10 and requires approximately 10 hours of work per week. Details on teaching are given in section 4.2.3.

Note that a nominal “Continuous Registration Fee” replaces the tuition requirement after the fourth year. (See [Graduate School Policies and Regulations](#)³² for more information.) Students fulfilling their teaching requirements will be paid the standard stipend amounts in the terms up to and including the terms they are a teaching fellow. Afterwards, students may continue to assist in courses as a teaching fellow if they are hired by faculty. The teaching fellow stipend is paid in addition to student support. Stipend payments are made bi-monthly on the 15th and 30th of each month. If there are any irregularities with your paycheck, you should contact Payroll Services for assistance at employee.services@yale.edu. In order to receive payments, you must be enrolled full-time as a student. It is your responsibility to maintain an active status. Please ensure that your banking information is up to date for direct deposit purposes.

³²<http://catalog.yale.edu/gsas/policies-regulations/>

4.6 Office Space and Computing Resources

All PhD students are provided with individual work space in an office or laboratory. Information about specific space assignments is distributed during PhD orientation.

Through their adviser all doctoral students may gain access to Yale's [High Performance Computing Facilities](#).³³

4.7 Summer Internships

During your time as a doctoral student, you are allowed to participate in two summer internships. These internships are subject to approval by the Dean of Graduate Studies. When you have secured an offer, you must submit a Summer Internship Form available from the [Office of the Registrar Forms & Petitions](#)³⁴. A report is due at the conclusion of the internship and sent to the Administrative Dean of the Graduate School by October 1st.

4.8 When an Adviser Leaves Yale

If a student's adviser leaves Yale, then what happens depends on the student's state of progress toward a PhD. A student who has not completed the three-year residency requirement and been admitted to candidacy will normally be expected to find a new adviser or go with the departing faculty member and enroll in another PhD program. An advanced student normally finishes their dissertation while continuing under the technical supervision of the departed adviser and receives a Yale degree. In this case, the Graduate School may require that a current Yale faculty member agree to act as official adviser. Such a student will have two years to finish their dissertation before the Department will no longer be bound to accept it. The thesis defense must still be held at Yale, according to the usual rules.

5 Additional Information

This section covers other practical day to day issues and pointers to additional university resources.

5.1 Leaves of Absence

Students may feel the need to request a leave of absence. The Graduate School provides the policies and procedures for requesting leave in under [Academic Regulations](#)³⁵.

³³<https://research.computing.yale.edu/services/high-performance-computing>

³⁴<https://registrar.yale.edu/forms-petitions>

³⁵<http://catalog.yale.edu/gsas/policies-regulations/academic-regulations/#leavesofabsence>

5.2 Writing and Presentation Skills

Students may want additional practice in writing and presenting research. The Department offers CPSC 992 *Academic Writing* to assist students in developing these skills. Note that this course does not satisfy the course requirements for the PhD or MS degrees.

5.3 McDougal Graduate Center

The [McDougal Graduate Center](#)³⁶ offers many support services for graduate students. Visit the Center at Founders Hall, 135 Prospect St. Graduate students can access the building with their ID card.

5.4 Career Services

The [Office of Career Strategy](#)³⁷ offers services for both [Masters](#)³⁸ and [Ph.D.s and Post-docs](#)³⁹. Visit the OCS site to sign up for newsletters and see upcoming events such as job fairs.

5.5 International Students

Students in the Computer Science department come from all over the world. The [Office of International Students Scholars](#)⁴⁰ is the resource for reliable information on visas and travel. OISS offers many services and visiting the office is described in [OISS Hours, Directions Parking](#)⁴¹.

5.6 Yale Public Safety

Yale Public Safety provides many services designed to keep the Yale community safe. There are over 500 Blue Phones on campus, and individuals may use the [LiveSafe app](#)⁴² to turn their mobile device into a safety device.

The Security department provides nighttime safe rides as well as walking escort services upon request. Community members may also request Police and/or Security presence at events. Please visit the public safety website to find links to all Yale apps that are available to help you keep track of Yale Shuttle schedules,

³⁶<https://gsas.yale.edu/resources-students/student-life-community/mcdougal-graduate-student-center>

³⁷<https://ocs.yale.edu/>

³⁸<https://ocs.yale.edu/channels/masters/>

³⁹<https://ocs.yale.edu/channels/phds-postdocs/>

⁴⁰<https://oiss.yale.edu/>

⁴¹<https://oiss.yale.edu/about/hours-directions-parking>

⁴²<https://your.yale.edu/community/public-safety/stay-safe-campus/livesafe-app>

request a walking escort and other useful resources. <https://your.yale.edu/community/public-safety/stay-safe-campus>

5.7 Other Resources

Students are encouraged to seek assistance in improving their advising relationships and resolving any issues through a variety of Yale's resources and offices. These include but are not limited to:

- Graduate School of Arts Sciences Dean's Office, 1 Hillhouse Avenue; (203) 432-2733. <http://gsas.yale.edu/office-directory>
- Office for Graduate Student Development Diversity, 1 Hillhouse Avenue; (203) 436-1301. <http://gsas.yale.edu/diversity/>
- University-Wide Committee on Sexual Misconduct, 55 Whitney Avenue; (203) 432-4449. <https://uwc.yale.edu/>
- Office of Institutional Equity and Access; 221 Whitney Avenue, 4th Floor; (203)432-0849. <https://oiea.yale.edu/>
- Sexual Harassment and Assault Response Education (SHARE); 55 Lock Street, Lower Level; (203) 432-2000. <http://sharecenter.yale.edu/>
- Mental Health Counseling, 55 Lock Street, 3rd Floor; 203-432-0290. <http://yalehealth.yale.edu/mentalhealth>
- Resources for Students to Address Discrimination and Harassment Concerns. <https://studentdhr.yale.edu/>
- Poorvu Center for Teaching and Learning, 301 York Street; (203) 432-4765. <http://poorvucenter.yale.edu/>
- Computer Science Graduate Student Advisory Committee (GSAC);<https://cs-gsac.sites.yale.edu/>