THE
COMPUTER SCIENCE
PH.D. PROGRAM
AT
CARNEGIE MELLON UNIVERSITY

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Contents

1 Introduction

Carnegie Mellon's Computer Science Ph.D. program aims to produce well-educated researchers, teachers, and future leaders in Computer Science. The Ph.D. degree is a certification by the faculty that the student has a broad education in Computer Science and has performed original research in the area.

This document is an informal description of the Computer Science Ph.D. program; herein "we" refers to all the faculty and staff involved in the Ph.D. program. Currently, the Department Head is Srinvasan Seshan; the Director of the Doctoral Program is Todd Mowry and the Graduate Programs Manager is Deb Cavlovich.

To complete the Ph.D. degree, we require that each student

- Participate in *directed research* and complete at least 24 units of research at CMU or at an internship.

- Pass 72 university units worth of *graduate courses*, with certain distribution requirements.

- Serve as a *teaching assistant* at least twice.

- Demonstrate oral and written *communication skills*.

- Write and orally defend a *thesis*, a significant piece of original research in a specialized area of Computer Science.

We are committed to the principle that students may achieve competence through a variety of methods, including courses, seminars, projects, and independent study. Our program is also unique in that we encourage and expect students to engage in research from their first day in the Department. To help students fulfill these requirements, we provide these educational opportunities:

- An active research environment

- The *Introductory Course For CS Doctoral Students*, intended to give an overview of the research interests of the faculty and to familiarize new students with the people and facilities of the Department

- A large number of *graduate courses*: regularly offered area courses in algorithms and complexity, artificial intelligence, computer systems, programming languages, and software systems; advanced graduate area courses; special topics courses; practicum courses; and reading seminars—together covering a broad range of areas in Computer Science

- The *Emigration Course*, intended to prepare students for success in their post-graduate careers

The entire faculty meet twice a year to evaluate each student's progress. A student demonstrates progress by passing courses, doing directed research,

teaching, fulfilling the skills requirements, and doing thesis work. While students are encouraged to shape an educational program to suit their needs, financial support and/or permission to continue in the Ph.D. program depends on satisfactory progress each semester in at least some of these categories.

2   Overview of the Program

Carnegie Mellon's Ph.D. in Computer Science is, above all, a research degree. When the faculty award a Ph.D., they certify that the student has a broad foundation in Computer Science, has advanced the field by performing significant original research, and has reported that work in a scholarly fashion.

Before embarking on original research, we expect students to acquire a body of technical knowledge that includes a familiarity with the breadth of Computer Science as well as a deep understanding of a specialized area. The Introductory Course For CS Doctoral Students is the first step in this process, exposing the student to the many ongoing research activities and projects in the Department and School. Next, through structured coursework the student gains a broad understanding of the fundamental research issues in major areas of Computer Science, and has the opportunity to gain a deep understanding in the student's area of specialization. Finally, the thesis work itself guarantees that the student understands the area well enough to advance the state of knowledge in the field.

Below we sketch the progress of a typical student through the program. Since the program is flexible, the careers of some students depart from this script at one or more points.

Around the start of October of the first year, each student is matched with a suitable advisor, who helps the student pursue directed research in an area of mutual interest. If the student's research interests change, they are free to change advisors at any time.

During the first two years of the program, the student begins to gain the foundation of knowledge that will allow their to go on and become an expert researcher in Computer Science, primarily through the following two ways:

- By mastering a body of graduate material, achieved by passing 72 university units worth of graduate courses. Seventy-two units is equivalent to six full-time (12-unit) courses.

- By learning how to organize and begin to carry out original research, achieved by participating in directed research. What constitutes directed research is decided individually between the student and their advisor.

Twice, usually during the first three or four years, the student serves as a teaching assistant. While teaching or taking courses, we expect students to spend at least half their time doing directed research.

Our environment provides a myriad of opportunities for students to hone their writing and speaking abilities and to maintain their programming skills.

We expect students to satisfy their communications skills requirements within their first three years.

Each 12-unit course should require no more than a quarter of the student's time during any one semester. So, typically a student tries to complete all coursework by the end of two years, at which point the student becomes involved in full-time research and starts thinking about research directions for a thesis. As the student's thesis research direction becomes clear, the student writes a thesis proposal and assembles a thesis committee with help from the student's advisor. The student then completes and defends the thesis, and graduates.

Students, especially those who are about to finish, are encouraged to attend Emigration Course events. Participation is completely voluntary.

For students who have a strong desire to teach, we offer a special *Graduate Teaching Fellow* program. Students who opt to complete this program are rewarded with a special letter of commendation signed by the Department Head.

The Ph.D. program provides each student with a periodic evaluation of their progress. Continuation in the Ph.D. program is contingent on making satisfactory progress.

3 The Introductory Course For CS Doctoral Students

The Introductory Course For CS Doctoral Students (IC) is intended to provide a common starting point for the entering Ph.D. students. It is organized as a short, intensive two to three week session that starts the week before the beginning of the Fall semester. The IC's goals are

- To orient students new to the Department, through introductions to people (faculty, staff, other students) and through social activities.

- To introduce students to various research and educational topics of current interest to the faculty.

- To give students an opportunity to find a suitable research advisor.

- To familiarize students with the computing facilities and environment at Carnegie Mellon.

These goals are fulfilled through a program of lectures, poster sessions, demonstrations, and tours of laboratories. Enough open hours are scheduled to allow students to meet with faculty individually to learn more about their research. Since all first-year graduate students are required to attend the IC, most regular graduate courses for all CS Ph.D. students do not start until the intensive part of the IC is over.

4   Advisors

Except during their first month in the program, each student has a faculty advisor charged with guiding the education and monitoring the progress of the student through the program. This personal student-advisor relationship ensures that every student receives the necessary faculty mentoring. Throughout the program, the advisor is responsible for guiding the student's research and education. Early in the program, the advisor guides the student along some research initiative and helps with strategic planning for courses and other educational activities. Later, the advisor helps to focus the student's research interests towards a thesis topic. Toward the end of the program, the advisor chairs the student's thesis committee, and helps to select the other members of the committee. The advisor also provides the student with career advice.

How are advisors initially chosen? After a little over a month at CMU, entering students are matched with faculty advisors by the "handshake" process. Students list faculty preferences and faculty list student preferences; a committee then matches each student with a faculty member, taking into consideration each of their preferences and other factors. Students base their faculty preferences on research interests. They can learn about an individual faculty member's research interests by attending the faculty's research presentation during the IC, by reading the Department's annual Faculty Research Guide, and from meeting individually with different faculty members during their first month here.

There is flexibility in the kind of relationship a student has with their advisor. Some students work more closely with their advisors than any other faculty member, and some students work more closely with another faculty member on a particular research project. A few students have two co-advisors. While it must be approved by the Director of the Doctoral Program, a request to switch advisors is routine and almost always granted for a student in good standing, especially during the early part of the degree program. It often results from an evolution of the student's research interests.

There are many faculty both within SCS and outside SCS who have advising privileges and can either function as sole advisors or co-advisors. Please see `http://www.cs.cmu.edu/~csd-grad/thesiscommittee.html` for a full list of people with advising privileges. Suggested additions to the Approved List should be made by contacting the Department Head. A CSD faculty advocate is required for anyone wishing to be added to the list.

5   Directed Research

Different students, and different advisors, have different ideas of what directed research means and how progress can be demonstrated. It is the responsibility of both the student and their advisor to formulate for each semester a set of reasonable goals, plans, and criteria for success in conducting directed research. Despite this variation, there are certain expectations that all students should meet.

During a student's first two years, they should be doing directed research at least half time; once all coursework is completed and before doing thesis research, full time (except when teaching). Note that we typically expect students to also use the summer semester to make progress on their Ph.D. research. Students can either work on their research at CMU or as part of an internship at a company to make this progress.

There are official course numbers associated with both directed research at CMU and internships. Active students (excludes, LOA and ABS status; Dual Degree Portugal students; and students on vacation semester) must enroll in these courses each semester and will receive a pass/fail grade. Active students are required to complete 24-48 units of Graduate Reading and Research each Fall, Spring and Summer semester. During any semester, students may substitute up to 36 units of Computer Science Practicum for these research units. Note that students typically substitute practicum units for research units 3-4 times during their Ph.D. degree program. Substituting more than 4 times requires approval from the Ph.D. program director. International students must consult with Office of International Education (OIE) for eligibility before seeking an internship/practicum or signing an offer contract.

Note that neither research or practicum units count towards the 72 unit coursework requirement.

Advisors are individually responsible for adequately supervising this portion of the Ph.D. program.

6   Course Requirements

Every student must complete 72 university units (typically 6 classes) worth of graduate courses. In addition, we have defined *five breadth subject areas* (defined below) in computer science. To ensure that students acquire sufficient exposure to basic knowledge concepts, we require that students take at least one class from four of these subject areas. Students can use the remaining two courses (24 elective units) to gain more depth in the student's particular area of research.

6.1   Five Breadth Subject Areas

Each student must pass one *approved* course from four of these areas:

- Algorithms and Complexity

- Artificial Intelligence

- Computer Systems

- Programming Languages

- Software Systems

Only certain classes in each area fulfill this requirement. However, each area provides multiple approved courses. The approved breadth courses are 12 university units each. The list of currently approved classes in each area is available at `https://www.cs.cmu.edu/~csd-grad/breadth.html`. Note that there may be classes beyond this list that can satisfy the breadth requirement for an area. You should contact the *Area Advocate* to determine if there are alternative classes for an area in a particular semester.

We attempt to schedule these courses so that students can satisfy their breadth requirement in a one-year period; however, since we expect students to be engaged in directed research at least half-time, a typical student should plan to satisfy their breadth requirement over a two-year period.

6.2 Twenty-Four Elective Units

Students must also take 24 university units worth of elective courses, at least 12 of which are from graduate courses offered by the School of Computer Science (not just the Computer Science Department); the other 12 may be from graduate courses offered by the rest of the University. These graduate courses must be level 700 or above.

Students may use electives to gain additional depth of knowledge in the student's research area, e.g., to complement their directed research or to prepare them for choosing a thesis topic. Students may also use electives to gain additional breadth of knowledge in an area outside of the student's research area.

Though students typically take courses to satisfy the elective units requirement, there are three other means of passing these units: doing an internal project, carrying out an external project, or teaching a graduate course. For students in some areas such as algorithms, it might make more sense to take advanced courses; for students in other areas such as software systems, it might make more sense to do a project. For those who like to reinforce knowledge by teaching, we provide the opportunity to obtain elective credit by being a teaching assistant.

We strongly advise students to choose electives in consultation with their advisor. The student and their advisor are both responsible for making sure that through these 24 elective units the student gains new knowledge, perhaps to fill gaps or to prepare for thesis research. They are also responsible for balancing how a student fulfills these units (through courses, projects, or teaching), taking into consideration the student's career goals, and the student's strengths and weaknesses in research, teaching, communication skills, and programming ability.

Students are free to take more than the required number of elective units.

6.2.1 Project Unit

One way to obtain elective unit credit is through a faculty-directed project. Doing a project has the same primary goal of taking a course: the acquisition

of knowledge. As a side benefit of doing a project a student often learns new research skills.

Here are some rules-of-thumb for considering what qualifies as a project which may be used for elective credit:

- The scope of the material learned should broaden the student's education; it should not be too narrow.

- The work should be something other than that which would otherwise be done as part of the student's directed research or as part of the research project run by the student's advisor.

- A student should be able to complete the project working full time for no more than one month (or quarter time for one semester). The time frame for doing the project does not have to respect semester boundaries, but a deadline for completion should be set.

- The project should have a written component resulting in a paper or technical report that demonstrates a high quality of writing.

- The project should also have an oral component requiring that the student present a brief (seminar length) description of the work performed. The student is responsible for scheduling the talk, and the project advisor is required to attend. The talk may be given externally.

To get a project approved for elective credit, a student submits a short (1-2 page) description of the project, written with the guidance of the project advisor. The proposal should clearly explain how the proposed work addresses the educational goals of the student.

Every project must be approved by two faculty members and the Director of Graduate Programs. The two faculty members are the project advisor and the student's regular advisor. In the case that the regular advisor is also the project advisor, the student and advisor need to select some other appropriate faculty member to evaluate the proposed work independently.

6.2.2   Fahlman Teaching Unit

Another way to get elective unit credit is by being a teaching assistant for one of the Ph.D. breadth courses. We call such elective credit a "Fahlman Unit," named after its proposer. To qualify, a student must have already taken and passed the course for which they plan to be a teaching assistant. Again, in the spirit of the educational objectives of coursework, doing a Fahlman Unit should broaden the student's education. Students who wish to do a Fahlman Unit should contact the Director of the Doctoral Program who coordinates with the student's advisor and course's instructor in approving the credit.

The two teaching assistant (TA) requirements (see below) are completely separate from Fahlman Units. A student may not use one course to satisfy simultaneously elective units and a TA requirement.

6.2.3   V Unit

A third way to obtain elective unit credit is to carry out an external project, exploring, for example, the role of computer science in society, or articulating a vision for new multi-disciplinary research involving computer science. A V Unit must be preceded by a proposal, to be approved by a faculty advisor and the Director of the Doctoral Program. More information on the V Unit can be found at `http://www.cs.cmu.edu/~vunit`.

6.3   Placing Out of Classes

Waiving a course requirement implies reducing the total number of units a student must take. For example, a student transferring to Carnegie Mellon from another Ph.D. program might be able to get waivers for a breadth or elective course already taken elsewhere. This waiver will be recorded as a 12 unit course transfer and count towards the 72 unit requirement for graduation. Students can place out of at most one course in total.

The mechanism for the waiver of a course requirement is for the student to contact the Director of the Doctoral Program and the responsible *Area Advocate* with the course syllabus and other supporting materials used in the course taken already. Students must request this waiver during the first semester after they enroll in the CS PhD program. While the coverage of the course does not need to be identical to the CMU equivalent, the course should have a similar goals and coverage as a CMU course.

The final decision made by the Director of the Doctoral Program, in consultation with the Area Advocate and relevant Carnegie Mellon course faculty, may be immediate or conditional, based on having the student either (1) take and pass an oral exam (conducted by the Area Advocate and the instructor(s) of the course to be waived), or (2) take and pass its final exam. Doing a side project is not a possible condition for waiving a course requirement.

Carnegie Mellon University offers students the opportunity to take courses for credit through a cross-registration program - Pittsburgh Council on Higher Education (PCHE). These courses can be used as elective credits but do not satisfy degree requirements for the Computer Science Ph.D.

7   Teaching Requirement

The ability to teach is an important skill for all scientists, not only for those who plan to teach after completing their degrees. Teaching skills include the ability to communicate technical material ranging from elementary to advanced, and to communicate technical material to audiences ranging from general to specialized. Thus, we expect students to develop and exercise teaching skills as part of their graduate education.

Students have ample opportunities to present advanced material while working on research projects, by participating in research seminars and by giving practice conference talks. To gain experience in presenting more elementary

material, we require that all graduate students help teach two courses. The norm is for students to teach one introductory-level undergraduate course and one advanced-level undergraduate course. Current policy (which is subject to change from semester to semester) is that graduate breadth courses in the Computer Science Department with an enrollment of 20 or more are also eligible for TA credit. *In particular, courses in other units in the School of Computer Science, or advanced graduate courses are* **not** *eligible for satisfying the teaching requirement.*

It is important that **all** teaching that is to count towards the teaching requirement must be assigned and approved **in advance** by the TA coordinator (currently Charlie Garrod), and the Director of the Doctoral Program for graduate courses (currently Todd Mowry). Students' preferences will be taken into account, but cannot always be honored.

We encourage students to teach more than twice. At the semi-annual evaluation of students the faculty give special recognition to those who do an outstanding job as a TA and to those who teach beyond the required load. The School of Computer Science offers a TA workshop which we encourage students to take advantage of.

General information about TA-ing can be found at: `https://www.ugrad.cs.cmu.edu/ta/general.html`

7.1 Evaluation and Certification of English Fluency for Instructors

Graduate students are required to have a certain level of fluency in English before they can instruct in Pennsylvania, as required by the English Fluency in Higher Education Act of 1990. Through this Act, all institutions of higher education in the state are required to evaluate and certify the English fluency of all instructional personnel, including teaching assistants and interns.

The full university policy can be reviewed at: `https://www.cmu.edu/policies/faculty/evaluation-certification-english-fluency-instructors.html`

In addition to administering the International Teaching Assistant (ITA) Test (a mandatory screening test for any non-native speaker of English), the Intercultural Communication Center (ICC) helps teaching assistants who are non-native English speakers develop fluency and cultural understanding to teach successfully at Carnegie Mellon.

Visit the ICC website for additional information: `https://www.cmu.edu/icc`

8 Written and Oral Communication Skills

To be a well-rounded computer scientist each student should have not just basic knowledge, but also the abilities

- To communicate technical ideas clearly in writing

- To communicate technical ideas clearly orally

We also expect students to be able to program, but there is no formal checkpoint to certify programming skills. It is left up to the advisor and student to make sure the student has the necessary skills.

8.1 Writing Skills

To satisfy the written communication skill requirement each student must write a scholarly document, as either its sole author or its primary author (if co-authored), that is at least the quality of a Carnegie Mellon technical report. The student obtains written final approval of the document from at least two SCS faculty members and one SCS Ph.D. graduate student. A co-author on a paper can not be a reviewer of that paper to satisfy the writing requirement, and one of the reviewers must be a faculty member of the Department of Computer Science.

This document must be a scholarly paper with references to the literature that could be sent for peer review. It can be

- A technical report

- A submitted, accepted, or published conference or journal paper (rejected papers may count since sometimes conference program committees and journal editorial boards have their own agendas)

- A document written to satisfy a course requirement (e.g., a course project's final report)

- A comprehensive survey paper, e.g., suitable for *ACM Computing Surveys*

Annotated bibliographies, user manuals, and reference manuals do not qualify because they do not require the same kind of explication, organization, and summarization skills needed to write a conference- or journal-like publication.

It cannot be

- The thesis proposal

- The thesis

The student should iterate with at least one faculty member, not necessarily the advisor, in writing this document. To determine whether the writing requirement has been satisfied, the student eventually must get at least two faculty members and one graduate student to read the document, to provide written feedback by filling out a Writing Review Form (available from the Graduate Program Manager or at `http://www.cs.cmu.edu/~csd-grad`), to meet and discuss this feedback, and to give final approval by signing the form accordingly. The student then gives these three (or more) signed forms to the Graduate Programs Manager who keeps copies in the student's file and indicates in the student's records that the requirement has been satisfied.

Students are responsible for asking the appropriate faculty members and Ph.D. student to help them with satisfying their writing requirement.

We expect students to be able to satisfy this requirement within their first three years and prior to their thesis proposal.

Computer Science Ph.D. students are welcome to enroll in the undergraduate communications course, required of undergraduate majors, to enhance their writing skills; however, taking it does not serve to satisfy the written communication skills requirement.

8.2 Speaking Skills

The Department and School provide many opportunities for students to practice their speaking skills. Here are just a few:

- Research area seminar series (AI, CS, Logic, POP, PS, Theory)

- Research unit seminar series (MLD, HCII, LTI, Robotics)

- Regular lunchtime talks (e.g., SDI lunch, Graduate Student Seminar Series)

- Research area group meetings (e.g., Machine Learning, Theory)

- Oral presentations in regular graduate courses or as part of a project course (see Section 6.2.1)

- Recitations, tutorials, and guest lectures (as a teaching assistant)

To satisfy the oral communication skill requirement each student should give a public talk at Carnegie Mellon. The talk is scheduled so that members of a standing committee, the *Speakers Club*, can attend, evaluate the student's talk, and provide oral and written feedback to the student.

This talk must be accessible to a general computer science audience. It should be advertised as "In Partial Fulfillment of the Speaking Requirement" so the audience knows what kind of feedback the student is seeking and so all interested and available Speakers Club members can mark their calendars accordingly.

Students should be able to use existing forums (e.g., those listed above) to give their talk, and thereby avoid having to schedule a special talk. Of course it is acceptable if the student wants to schedule a special time and date, but the student should take care to ensure that an audience beyond the three required members of the Speakers Club (two faculty and one student) is present at the talk. The Speakers Club "robot" helps students schedule their talks, ensures a quorum of Speakers Club members is met, and reminds Speakers Club members of their responsibility and commitment to attend talks. Due to contention for popular times (especially the Student Seminar Series), talks must be scheduled at least three weeks in advance.

All Speakers Club members are welcome to attend the advertised talk. Immediately after the talk, those members in attendance confer among themselves

(with the student absent) about the talk. They also each fill out a Speaking Review Form, available from the Graduate Program Manager. If at least two faculty members and one graduate student member of the Speakers Club grade the student's talk to be "Good" or better, then the student passes. If not, the student will be required to give another talk. After a decision has been made, one of the attending faculty members volunteers to discuss the feedback and outcome privately with the student.

After the talk, when the student passes, they take all signed forms to the Graduate Programs Manager who keeps copies in the student's file and marks in the student's records the completion of this requirement. Much of this part of the process is like what happens after a thesis proposal presentation or thesis defense; the focus here, however, is on oral communication skills.

As with writing, speaking well takes practice. Satisfying this requirement might take a few tries on the student's part. For students who are naturally good speakers or are already experienced speakers, one try may suffice. No stigma is attached to those who have to try more than once.

9 The Thesis Process

The thesis must describe a significant piece of original research work. It is evidence of proficiency, high attainment, and ability to do research in a specialized area of computer science.

A more extensive checklist with specific information on the thesis proposal and thesis defense is available at `http://www.cs.cmu.edu/~csd-grad`. Every student must read and adhere to these more detailed process rules.

9.1 Thesis Proposal

The student submits a written proposal to the faculty. The student also orally presents the thesis proposal to interested faculty and students in a public colloquium.

A thesis proposal should

- Explain the basic idea of the thesis topic (e.g., the problem to be solved and the approach to solving it)

- Argue why that topic is interesting (e.g., what contributions to the field would be made in carrying out the proposed work)

- State what kind of results are expected

- Argue that these results are obtainable within a reasonable amount of time

- Demonstrate the student's personal qualifications for doing the proposed work

The main purpose of the thesis proposal is to convince the faculty that the chosen thesis topic is significant and that the student's approach has a reasonable chance of success. A thesis proposal gives the faculty the opportunity to pass such judgment at the start of the work and not at the end. We want to minimize the chance that a thesis will be turned down when almost completed. We expect students to present their thesis proposals as early as possible, not halfway through writing the thesis. A thesis proposal should be short, about 15–20 pages.

A thesis proposal should *not* be

- A dry run for the thesis

- A summary or abstract of the thesis

- The first chapter or part of the thesis

- A technical report

- A survey of the field

- An annotated bibliography

Any included list of references or bibliography should serve the purpose of supporting the assessment of the state of the art and the student's personal qualifications.

To provide ample notice to the public, at least one week in advance of the oral presentation, students should provide the Graduate Program Manager with one hardcopy of the thesis proposal, an on-line copy of the proposal's abstract, and a list of the thesis committee members, including the external member. The Graduate Programs Manager posts the public announcement of the thesis proposal presentation.

Please remember that at least two thesis committee members (including the Chair) must be physically present for the thesis proposal.

Upon completion of the thesis proposal the student must complete a Doctoral Candidate Contractual Agreement Form provided by the Graduate Programs Manager.

9.2   All But Dissertation (ABD) Policy

After the presentation of an acceptable thesis proposal, and satisfying all other requirements except for the dissertation and its oral defense, students are regarded as in "all but dissertation" status.

Time to Degree: Once students achieve ABD status, students who began in the PhD program prior to June 1, 2011 must complete all requirements for the PhD within a maximum of seven full academic years, unless terminated earlier by conferral of the degree or by academic or administrative action.

Students who began in the PhD program after June 1, 2011 must complete all requirements for the PhD within a maximum of ten years from original

matriculation as a doctoral student, unless terminated earlier by conferral of the degree or by academic or administrative action.

Once this time-to-degree limit has lapsed, the person may resume work towards a doctoral degree only if newly admitted to a currently offered doctoral degree program under criteria determined by that program.

An ABD candidate may choose to continue as a regular student *In Residence*, or to be *In Absentia* (ABS). Please see the University policy:

https://www.cmu.edu/policies/student-and-student-life/doctoral-student-status.html

ABS - In Absentia: Students who leave CMU but plan to continue working on the thesis will be classified as ABS. These students should not require substantial use of university resources, but are permitted use of the libraries and consultation with faculty or students as necessary. While a candidate is ABS are required to pay the university technical fee each semester. No formal enrollment or payment of tuition is required, with the exception of the academic semester in which the degree requirements are completed. A candidate who is ABS is required to enroll for a minimum of five units during the academic semester in which the degree requirements are completed. Charges for these units are the responsibility of the candidate.

Since an ABS candidate will not be certified by the University as a "student" for immigration purposes, non-resident alien students who become ABD should not choose to become ABS.

ABD - In Residence: Students who are self-supporting and are in ABD status may remain on campus to complete the thesis. They must register and pay for a minimum of five units each semester. However, students who receive a stipend predicated on their status as a graduate student and paid by or administered by the university will be required to register for a minimum of 36 research units. Nearly every ABD student in CS falls into this latter category.

9.3   Thesis Committee

The student's advisor chairs the thesis committee. All other committee members, including the external member, should be agreed upon before the thesis proposal presentation. Members of the student's committee must accept the responsibility of meeting with the student regularly to ensure that the research is progressing in the right direction. The Thesis Committee must consist of at least one Computer Science Department faculty, two members of SCS faculty, and/or other approved faculty and an external committee member. Please see http://www.cs.cmu.edu/~csd-grad/thesiscommittee.html for a full list of people with advising privileges. Thesis committees and any changes to committees are subject to departmental approval.

Please remember thesis committee members (including the Chair) must be physically present for the thesis proposal (at least two) and defense (at least three).

9.4   Thesis

The thesis must describe a piece of original research work and must describe it well. It is on this basis that the Department certifies the qualifications of the new Ph.D. Furthermore, it is the most important basis on which the scientific community judges the initial achievement and potential of that individual.

9.5   Thesis Defense

The student's thesis committee decides whether to accept the thesis based on its content and the outcome of the *thesis defense*, which is a public presentation describing the contributions of the thesis.

At least one week in advance of the oral presentation, students must provide the Graduate Programs Manager with:

- One hard copy of the thesis abstract

- A digital copy of the abstract in text format .rtf, .txt, or .docx, *(No .pdf please)*

- A list of all thesis committee members

The Graduate Programs Manager posts the public announcement of the thesis defense.

Before the thesis defense, the entire thesis committee is expected to have read the entire thesis, to have given comments to the candidate, and to have given approval for scheduling the public defense. This means that a copy of the complete thesis document should be provided to the whole thesis committee a minimum six weeks in advance of any proposed date for the defense. Significant deviations from this rule must be approved by the Director of the Doctoral Program. Committee members should meet briefly before the thesis presentation to discuss any issues.

The presentation by the candidate is normally about 45 minutes, followed by a question-and-answer period which may be as long as needed. Please remember that at least three thesis committee members (including the Chair) must be physically present for the thesis defense. The thesis committee chair (advisor) determines who may ask questions and in what order and brings the discussion to a close at the appropriate time. The question-and-answer period is followed by a closed-door session attended by only the members of the thesis committee and any interested faculty members. The options of the committee are:

- To approve without corrections

- To approve subject to minor changes, to be approved later by the thesis chair only

- To require a resubmission after major changes and reapproval of the entire committee

- Not to approve the thesis

All members of the committee are required to sign a Final Oral Examination card, indicating that the student has passed the thesis oral examination. In addition, the thesis committee chair, the Department Head, and the Dean sign a final certification sheet when the student submits the final version of the thesis.

9.6   Graduation Certification

The Graduate Programs Manager maintains a checklist of procedures for scheduling the thesis oral presentation and completing the other requirements for graduation. The Graduate Programs Manager certifies fulfillment of requirements for graduation only when the final version of the thesis has been approved by the thesis committee, the Department Head, and the Dean. Students are not allowed to participate in commencement exercises unless final certification has been made.

If the final copy of the thesis is not submitted within one year of the thesis defense, the faculty may require a second defense before making a final certification.

10   The Emigration Course

In addition to doing research and taking courses, students also learn leadership and survival skills as part of their education in the Ph.D. program. Most directly, they obtain these skills through their advisors. To supplement this personal mentoring, we offer the *Emigration Course*. Whereas the Introductory Course For CS Doctoral Students prepares entering students for their graduate career while at Carnegie Mellon, the Emigration Course grooms finishing students for their career afterward. The Emigration Course is structured as a series of talks offered throughout the year and focuses on five topics: Jobs, The Real World, Money, Ethics, and Communication. These talks cover nuts-and-bolts issues like how to job interview, how to apply for grant money, and how to write a technical paper. They also expose students to traditional and non-traditional career paths in academia, industry, and government.

Participation is open to the entire SCS community and is completely voluntary. More senior students, especially those planning to finish in any given year, are encouraged to attend sessions offered that year; however, even junior students can benefit from attending, to prepare for a smooth transition from life as a student to life in the real world.

11   Community Spirit

Our sense of community is well-known as a distinguishing aspect of doing computer science at Carnegie Mellon. It is one of the reasons many students choose

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to come here. The Computer Science Department is proud of our strong community spirit, which we foster through close working relationships between students and advisors, among faculty, and among students. Many working relationships turn into friendships for life.

Luckily, our community works. People volunteer their time, energy, intellect, talent, and other skills to do many of the things that keep our environment running smoothly. These efforts include organizing seminars, maintaining software packages, serving on departmental committees, grading for a graduate course, planning and running social activities, giving tours, and hosting visitors.

12   Graduate Teaching Fellow Program

To encourage and recognize exemplary activities in teaching and education by Ph.D. students, we offer the Graduate Teaching Fellow program as part of the Computer Science Ph.D. program. Students who successfully complete this program are rewarded with a letter that documents the teaching accomplishments of the student and explains the requirements that were satisfied to complete the Teaching Fellow program. The letter is written and signed by the Department Head. There is no special designation on the Ph.D. diploma itself.

Any CSD Ph.D. student in good standing is eligible to enter the Teaching Fellow program, and may remain as long as good standing is maintained. Participation in the Teaching Fellow program does not in any way reduce or replace any of the usual Ph.D. requirements. Progress through the Teaching Fellow program is monitored by a faculty member appointed for this purpose (henceforth referred to as the Teaching Fellow Monitor) and the DRC. The Ph.D. student is responsible for lining up the Teaching Fellow Monitor, who may or may not be the student's advisor.

The following are the requirements for completion of the Graduate Teaching Fellow Program:

1. Completion of at least six teaching seminars at the University's Eberly Center for Teaching Excellence.

2. At least one semester-long teaching experience involving significant responsibility for course *content*, *delivery*, and *management*. This teaching experience may take the place of one semester of the normal teaching requirement, though in many cases it is expected that this experience will be carried out as an additional semester of teaching.

   (a) For course content, the Teaching Fellow should be personally involved (typically jointly with a Lecturer or Professor) in the creation of a significant number of the course topics and materials, including elements such as the syllabus, lecture notes, homework assignments, projects, and exams. Any materials written by the Teaching Fellow may be submitted to the Monitor for review.

(b) For course delivery, the Teaching Fellow should give a significant number of lectures/recitations in the course. At least two of the lectures/recitations must be observed and reviewed by the Center for Teaching.

(c) For course management, the Teaching Fellow should be involved in a significant number of management activities, e.g., organizing and directing of other teaching assistants and graders, calculating mid-semester or final grades, and arranging for special classroom or laboratory facilities. If the Teaching Fellow is acting as a teaching assistant to an instructor, the instructor will be asked to comment on the management activities of the Teaching Fellow, for review by the Monitor.

Any teaching experience, if it is to be used to satisfy this requirement, must be approved in advance by the DRC.

3. Submission and review, by the Teaching Fellow Monitor, of a "tangible contribution" to education. Typically, this material would include course notes, syllabi, exams, homework, and course-related software. Other possibilities include outcomes from participation in curriculum and course design efforts.

Opportunities for significant teaching responsibility may be hard to find, so we encourage students to seek help from the Director of Graduate Programs, the Teaching Fellow Monitor, and the DRC. We also strongly encourage faculty to consider co-teaching arrangements with prospective Teaching Fellows. The Director of the Doctoral Program has a separate document that contains a detailed rationale for offering the Teaching Fellows program.

13 Masters Degrees

We are happy to grant any student a Masters Degree once they have passed all 72 course units, passed at least one of the two communication skills requirements, and taught at least once. No Masters Degree will be granted if you have received a Masters Degree in another area of SCS. You must make your request in writing or via email to the Graduate Programs Manager.

14 Student Support

14.1 Academic Year Support

The Department aims to allow students as much freedom as is possible in choosing research directions, subject to the interests and expertise of the faculty who are available to oversee the work. Thus, the Ph.D. program generally decides which funding source to use to support a student *after* the student has chosen an

advisor or research area. On occasion, the Ph.D. program is able to obtain an individual fellowship for a student through external sources. We also encourage students to seek their own external funding since often the award is prestigious (e.g., NSF or Hertz) or the source provides an opportunity to make professional connections (e.g., an industrial fellowship).

If a student receives and external fellowship/scholarship, they must notify the Graduate Programs Manager. The Department supplements the stipends of students with an outside fellowship to meet (and usually exceed) the stipends of students with internal funding. To any student whose spouse or qualifying domestic partner earns less than $200 per month, the Department pays a dependency allowance that is 10% of the student's SCS monthly stipend per dependent.

14.2 Summer Support

There is summer support available for many students, particularly for those working on their dissertation. However, we believe it is also good for students to gain experience in industry for one or two summers during their career here at Carnegie Mellon. Faculty and staff will provide help in finding suitable summer employment.

14.3 Travel Support

The department encourages students to travel to conferences and workshops to enhance their professional and career development.

If a student wants to attend a conference or workshop, the student's advisor or research sponsor should support the trip through either a research contract or a discretionary account.

If no such funding is available to the student, then limited departmental funds may be available upon request from the department. Since departmental funds are limited, some requests may not be approved, and some may not receive full funding; however, the department will try to support a student's travel as much as possible. Funding is usually available to a student for no more than one departmentally-sponsored trip per year.

To obtain travel support, the student and their faculty advisor/research sponsor must first agree that the student should take the trip. Then *in advance of the trip* the student should get a Student Travel Authorization Form: `https://www.cs.cmu.edu/~csd-grad/Student_Travel_Auth.pdf`, and then the advisor/research sponsor's signature (on the Faculty Research Sponsor line). The faculty member must either (i) indicate the amount of support the student may receive and its source (be sure the charge number is filled in!), or (ii) state that no funds are available from any research or discretionary account.

If no faculty support is available, the student should submit the signed form to the Associate Department Head – Finance and Administration for approval of departmental sponsorship. The maximum to be reimbursed will be $200 plus

the registration fee, if only attending the conference or workshop; $600 plus registration fee, if presenting a paper.

Additional graduate student conference funding may be available and is provided by the Graduate Student Assembly and the Provost's Office, and is managed by the Office of the Assistant Vice Provost for Graduate Education. More information is available on their web site: `https://www.cmu.edu/graduate/professional-development/conference-funding/`

14.4 Consulting and Outside Employment

Consulting is a privilege, not a right. We grant this privilege for one of two reasons:

- The consulting task is relevant to the student's thesis work or a Carnegie Mellon research project.

- The student has exceptional financial obligations.

Consulting is normally limited to a maximum of one day per week.

A student who wishes to consult should obtain permission from their advisor and the Director of the Doctoral Program, and fill out an approval form, available from the Graduate Programs Manager.

We may require that students limit outside employment in order to be in compliance with university and government rules.

15 Leave of Absence and Withdrawal

15.1 Leave of Absence

Students who wish to leave the program temporarily may request a leave of absence (LoA) by submitting a request to the Director of the Doctoral Program. Leaves are initially granted for a period of no more than one year, but an extension of up to one additional year may be granted under exceptional circumstances. When an extension is granted, the conditions for return must be negotiated with the advisor and the Director of the Doctoral Program prior to returning to the program. Students must be in good standing in order to be granted a leave of absence.

Students on leave of absence should contact the Graduate Programs Manager two months prior to the end of the leave to indicate their plans. While a leave can in principle start at any time, university regulations allows students to return only at the beginning of a semester (usually in late August or in January).

University Policy for Leave of Absence: `https://www.cmu.edu/policies/student-and-student-life/student-leave.html`

University process for Leave of Absence: `https://www.cmu.edu/hub/registrar/leaves-and-withdrawals/`

15.2 Withdrawal

University policy for withdrawal: `https://www.cmu.edu/hub/registrar/leaves-and-withdrawals/`

University process for withdrawal: `https://www.cmu.edu/policies/student-and-student-life/withdrawal-of-a-degree.html`

16 Evaluation of Students' Progress

Evaluation and feedback on a student's progress are important both to the student and to the faculty. Students need information on their overall progress to make long-range plans. The faculty need to make evaluations to advise students, to make support decisions, and to write recommendations to potential employers.

The faculty meet at the end of each semester to make a formal evaluation of each student in the Ph.D. program. For historical reasons this meeting is called "Black Friday." The purpose of having all the faculty meet together to discuss all the students is to ensure uniformity and consistency in evaluating across all the different areas, by all the different advisors, throughout the years of the Ph.D. program in CSD as it inevitably changes. The meeting consists of two parts, one in which subsets of the faculty from different research areas (Artificial Intelligence, Computer Systems, Programming Languages, Software Systems, and Theory) meet, and the other in which the entire faculty meet.

The faculty measure each student's progress against the goal of completing the Ph.D. program in a reasonable period of time. The evaluation considers all components of the program using indicators and information sources described below. Through a Black Friday letter the faculty inform students of the results of this evaluation, which may include specific recommendations for future work or requirements that must be met for continued participation in the program.

16.1 Components and Indicators

In their evaluation, the faculty consider the following components, though naturally only some of these components will be applicable in any given semester and they are not equally important at every stage of a student's career.

- *Courses taken*: Evaluated by the course instructor—brief prose evaluation/summary grade.

- *Directed research*: Evaluated by research supervisor and other collaborating faculty.

- *Teaching*: Evaluated by the course instructor and two different teaching evaluation forms (one filled out by the course instructor and the other filled out by students, where appropriate).

- *Skills*: Writing and speaking, evaluated by relevant faculty and forms.

- *Thesis*: Status summarized by the thesis advisor and commented on by members of the thesis committee.

- *Departmental/community service*: Reported by the student and evaluated by relevant faculty.

- *Other*: Lectures given, papers written, etc. Evaluated by cognizant faculty.

The faculty's primary source of information about the student is the student's advisor and the student statement. The advisor is responsible for assembling the above information and presenting it at the faculty meeting. The student should make sure the advisor is informed about participation in activities and research progress made during the semester. Each student is asked to submit a summary of this information to the faculty at the end of each semester— the *Student Statement for Black Friday* at `https://blackfriday.cs.cmu.edu`. This statement is used as student input to the evaluation process and as factual information on activities and becomes part of the internal student record. It is strongly recommended that the student and advisor meet prior to the faculty meeting to review the information provided in this statement.

16.2   Recommendations

Based on the above information, the faculty decide whether a student is making satisfactory progress in the Ph.D. program. If so, the faculty usually suggest goals for the student to achieve over the next semester. If not, the faculty make more rigid demands of the student; these may be long-term (e.g., finish your thesis research over the next 3 semesters) or short-term (e.g., select and complete one or more specific courses next semester; prepare a thesis proposal by next Black Friday).

Ultimately, permission to continue in the Ph.D. program is contingent on whether or not the student continues to make satisfactory progress toward the degree. If a student is not making satisfactory progress, the faculty may choose to drop the student from the program.

The faculty also decide whether financial support should be continued for each student. Termination of support does not always mean termination from the program, details regarding termination of support are provided in the student's evaluation letter.

16.3   Grades

Since the Ph.D. program is not based solely on conventional academic courses, it is difficult to associate grades with a student's accomplishments. Also, for students who complete the program, grades are largely irrelevant. However, passing grade for graduate courses is B- or better. Graduates are judged primarily on their professional achievements and the experience they have gained

during the program, and on the basis of recommendations from members of the faculty.

The Ph.D. program keeps an internal record of various information about a student's performance, such as final grades given in some graduate courses. This information is used at the Black Friday meeting. This information does not go on the student's university transcript.

Once the required coursework is completed, students register only for a blanket course (e.g., "Reading and Research") covering all their program activities for that semester, for which they receive a Pass/No Pass grade.

CSD Ph.D. students may formally register for graduate or undergraduate courses in other departments. However, they must register for these courses with pass/fail grading. A form to request pass/fail grading is available for download from the Hub: `https://www.cmu.edu/hub/docs/pass-fail.pdf`

17   Points of Contact

Students and advisors enjoy a close working relationship in our program. If students have problems, whether related to their research or not, they should feel free to speak to their advisors. If doing so is awkward or if students simply want a second opinion, they should feel free to discuss their problems with either the Director of the Doctoral Program (currently Todd Mowry) or the Graduate Programs Manager (currently Deb Cavlovich). Additional contacts for specific issues are listed in the following subsections.

17.1   Area Advocates

Issues regarding course requirements and placing out of classes should be directed to the appropriate Area Advocate. Currently, the Area Advocates are

- Artificial Intelligence: Tuomas Sandholm

- Algorithms: Danny Sleator

- Computer Systems: Todd Mowry

- Programming Languages: Karl Crary

- Software Systems: David Andersen

17.2   The Doctoral Review Committee

The Doctoral Review Committee is the official advisory committee to the Director of the Ph.D. program and the Department Head. While the structure and contents of the Ph.D. program are still discussed by the faculty and students as a whole, the DRC makes sure that the program's design is implemented and rules abided by properly. In this sense the DRC is also an oversight committee.

The DRC monitors all courses. It regularly asks students to evaluate courses and their instructors. It keeps statistics and data about all past and present CS Ph.D. students, discusses issues and problems that are specific to CS Ph.D. students, and makes minor policy decisions that do not require the attention of all the faculty and students.

The DRC is also something like a senate since the student representatives speak for all the students and the faculty representatives speak for all the faculty.

17.3   The Ombudsperson

If a student feels that none of the above avenues are appropriate for hearing about their problem, the student can turn to the Ph.D. program's *ombudsperson*. The ombudsperson's role and responsibilities are:

- To meet with students and listen to their problems

- To give advice, perhaps suggesting someone else to talk to or suggesting the next step to take

- To keep conversations confidential

The ombudsperson is supposed to be friendly, approachable, mature, a good listener, in their third year or higher (i.e., should "know the ropes" so to speak), and reasonable (of course!).

An ombudsperson is different from student DRC members since the DRC is an official committee. So, if a student has a personal problem (e.g., with their advisor), it may not be appropriate to talk to a student DRC representative about it (unless as just a friend). If the student feels uncomfortable approaching either of the Graduate Programs Managers about it, then the ombudsperson would be the perfect person to turn to.

Currently, the ombudsperson is Anna Gommerstadt.

Additionally, students may confer with the university graduate student ombudsman, Suzie Laurich-McIntyre, Assistant Vice Provost for Graduate Educations, laurichmcintyre@cmu.edu, on issues of process or other concerns as they navigate conflicts.

Graduate students will find the Summary of Graduate Student Appeal and Grievance Procedures on the Graduate Education Resource webpage:

`https://www.cmu.edu/graduate/policies/appeal-grievance-procedures.html`

17.4   Disability Services

The Office of Disability Resources at Carnegie Mellon University has a continued mission to provide physical and programmatic campus access to all events and information within the Carnegie Mellon community. We work to ensure that qualified individuals receive reasonable accommodations as guaranteed by the Americans with Disabilities Act (ADA) and Sections 503 and 504 of the Rehabilitation Act of 1973.

Students who would like to receive accommodations can begin the process through the Disability Resources online portal or email access@andrew.cmu.edu to begin the interactive accommodation process.

For more information please see `http://www.cmu.edu/education-office/disability-resources/`. Students with disabilities are encouraged to self-identify with Office of Disability Resources by contacting Catherine Getchel, 412-268-6121, getchell@cmu.edu to access the services available at the university and initiate a request for accommodations.

18 University Policies & Expectations

All policies not explicitly covered in this document adhere to university policies. These policies include the status of All But Dissertation (ABD) and In Absentia students, academic disciplinary actions, and grievance procedures.

It is the responsibility of each member of the Carnegie Mellon community to be familiar with university policies and guidelines. In addition to this departmental graduate student handbook the following resources are available to assist you in understanding community expectations:

- The Word/Student Handbook: `https://www.cmu.edu/student-affairs/theword/index.html`

- University Policies Website: `https://www.cmu.edu/policies/`

- University Policy on Grades `https://www.cmu.edu/policies/student-and-student-life/grading.html`

- Graduate Education Website: `https://www.cmu.edu/graduate/policies/index.html`

18.1 Academic Integrity

- University Academic Integrity Website - Please review the University expectations at: `https://www.cmu.edu/policies/student-and-student-life/index.html`

- Academic Integrity Policy - please review the entire policy at: `https://www.cmu.edu/policies/student-and-student-life/academic-integrity.html`

- University-wide Protocol for Graduate Students: `https://www.cmu.edu/student-affairs/ocsi/academic-integrity/grads.html`

18.2 Degree and Enrollment Verification and Transcripts

Enrollment Services is the only University office that can provide an official letter of enrollment, official transcript and enrollment verification.

Degree or Enrollment Verification: `https://www.cmu.edu/hub/registrar/student-records/verifications/index.html`

Transcripts: `https://www.cmu.edu/hub/registrar/student-records/transcripts/index.html`.

18.3 Withdrawal of Degree

The university reserves the right to withdraw a degree even though it has been granted should there be discovery that the work upon which it was based or the academic records in support of it had been falsified. In such a case, the

degree will be withdrawn promptly upon discovery of the falsification. The complete reference to this university policy is available at: `https://www.cmu.edu/policies/student-and-student-life/withdrawal-of-a-degree.html` Please see Appendices E through H for additional information about The Word and University resources.

18.4   Carnegie Mellon University Statement of Assurance

Carnegie Mellon University does not discriminate in admission, employment, or administration of its programs or activities on the basis of race, color, national origin, sex, handicap or disability, age, sexual orientation, gender identity, religion, creed, ancestry, belief, veteran status, or genetic information. Furthermore, Carnegie Mellon University does not discriminate and is required not to discriminate in violation of federal, state, or local laws or executive orders. Inquiries concerning the application of and compliance with this statement should be directed to the vice president for campus affairs, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, telephone 412-268-2056. Obtain general information about Carnegie Mellon University by calling 412-268-2000. The Statement of Assurance can also be found on-line at: `https://www.cmu.edu/student-affairs/theword/assurance.html`.

18.5   The Carnegie Mellon Code

Students at Carnegie Mellon, because they are members of an academic community dedicated to the achievement of excellence, are expected to meet the highest standards of personal, ethical and moral conduct possible.

These standards require personal integrity, a commitment to honesty without compromise, as well as truth without equivocation and a willingness to place the good of the community above the good of the self. Obligations once undertaken must be met, commitments kept.

As members of the Carnegie Mellon community, individuals are expected to uphold the standards of the community in addition to holding others accountable for said standards. It is rare that the life of a student in an academic community can be so private that it will not affect the community as a whole or that the above standards do not apply.

The discovery, advancement and communication of knowledge are not possible without a commitment to these standards. Creativity cannot exist without acknowledgment of the creativity of others. New knowledge cannot be developed without credit for prior knowledge. Without the ability to trust that these principles will be observed, an academic community cannot exist.

The commitment of its faculty, staff and students to these standards contributes to the high respect in which the Carnegie Mellon degree is held. Students must not destroy that respect by their failure to meet these standards. Students who cannot meet them should voluntarily withdraw from the university. The Carnegie Mellon Code can also be found on-line at: `http://www.cmu.edu/student-affairs/theword/code.html`.

18.6 Safeguarding Educational Equity

Policy Against Sexual Harassment and Sexual Assault

Sexual harassment and sexual assault are prohibited by CMU, as is retaliation for having brought forward a concern or allegation in good faith. The policy can be viewed in its entirety at: `http://www.cmu.edu/policies/documents/SA_SH.htm`. If you believe you have been the victim of sexual harassment or sexual assault, you are encouraged to make contact with any of the following resources:

- Office of Title IX Initiatives `http://www.cmu.edu/title-ix/`, 412-268-7125

- Sexual Harassment Advisors, found in appendix A of the Policy Against Sexual Harassment and Sexual Assault;

- Survivor Support Network, found in appendix B of the Policy Against Sexual Harassment and Sexual Assault;

- Sexual Harassment Process and Title IX Coordinators, found in section II of the Policy Against Sexual Harassment and Sexual Assault;

- University Police, 412-268-2323

- University Health Services, 412-268-2157

- Counseling & Psychological Services, 412-268-2922

Maternity Accommodation Protocol

`http://www.cmu.edu/student-affairs/theword/acad_standards/creative/studentmaternityprotocol.html`

Students whose anticipated delivery date is during the course of the semester may consider taking time away from their coursework and/or research responsibilities. All female students who give birth to a child while engaged in coursework or research are eligible to take either a short-term absence or formal leave of absence. Students in course work should consider either working with their course instructor to receive incomplete grades, or elect to drop to part-time status or to take a semester leave of absence. Students engaged in research must work with their faculty to develop plans for the research for the time they are away.

Students are encouraged to consult with relevant university faculty and staff as soon as possible as they begin making plans regarding time away. Students must contact the Office of the Dean of Student Affairs to register for Maternity Accommodations. Students will complete an information form and meet with

a member of the Deans Office staff to determine resources and procedures appropriate for the individual student. Planning for the students discussion with her academic contact(s) (advisor, associate dean, etc.) will be reviewed during this meeting.

18.7   Change of Address

`https://www.cmu.edu/hub/registrar/student-records/personal-information.html`

Students are responsible for notifying the department and HUB of all address changes in a timely manner. Students will be held responsible for any failure to receive official college notices due to not having a correct address on file; F-1 students may jeopardize their status if address information is not kept current. Students can change their address using SIO, which is available via the HUB website: `https://www.cmu.edu/hub/registrar/student-records/personal-information.html`.

A Time Estimates

The following table indicates estimates for approximately when students should have finished each requirement. Overall, we expect students to complete the program within 5–6 years, depending on background, research area, and dissertation research.

These figures are meant to be suggestive, not prescriptive. We present them so that all faculty and students can develop a shared image of the expectations of the program.

COMPONENT	INTENSITY	COMPLETION TIME
Introductory Course (IC)	full time	$2 + 2$ weeks
Breadth Courses	each 1/4 time	by end of year 2
Elective Courses	each 1/4 time	by end of year 2
Writing Skills	variable	by end of year 3
Teaching	1/2 time	by end of year 4
Speaking Skills	variable	by end of year 4
Thesis Proposal	1/2 time	by end of year 4
Thesis	full time	by end of year 5 (or 6)

Students are expected to be working on research every semester with intensity at least 1/2 time throughout their time at CMU. In addition, it is expected that students volunteer within the department and school throughout their time at CMU.

B Other Ph.D. Degree Programs and Specializations

Students admitted to the Ph.D. Program in Computer Science may also enroll in one of three alternate degree or specialization programs in the Computer Science Department: the Algorithms, Combinatorics, and Optimization (ACO) degree; the Pure and Applied Logic (PAL) degree; and the Center for Neural Basis of Cognition (CNBC) training program. Note that students must be admitted to those programs and that their degree requirements differ from the Computer Science Ph.D. program.

B.1 Algorithms, Combinatorics, and Optimization

The Ph.D. Program in Algorithms, Combinatorics and Optimization is an interdisciplinary program administered jointly by the department of Computer Science, the department of Mathematical Sciences, and the Operations Research group in Tepper School of Business (TSB). The purpose of the program is to bring together the strengths of the participating departments in topics such as algorithm design, graph theory, combinatorial optimization, integer programming, polyhedral theory, analysis of heuristics, and number theory.

Course of Study: For details regarding the program requirements, see the ACO web page at `http://www.cs.cmu.edu/~ACO` or ask for a copy of the ACO brochure. Completion of all degree requirements earns the student a Ph.D. in Computer Science: Algorithms, Combinatorics, and Optimization.

B.2 Pure and Applied Logic

The Pure and Applied Logic Program is joint with the Carnegie Mellon Mathematics and Philosophy Departments. Carnegie Mellon has a large and active group of faculty whose research and teaching interests span all aspects of logic, with a particularly strong concentration in foundational aspects of computing. This Logic Community has an established record of collaborations in pursuing theoretical research, conducting major implementation projects, and running colloquia and workshops.

Course of Study: CS/PAL students are admitted through their home department (Computer Science). They may choose to specialize in Pure and Applied Logic any time after their first year, though the expectation is that a mutual decision is reached by the end of their first year. CS/PAL students fulfill all the normal CS Ph.D. program requirements; however, rather than take 24 units of elective courses, they must take 48 elective units. CS/PAL students should choose their elective courses from a list of regularly offered courses in Pure and Applied Logic. Since some of these courses are taught in the Mathematics or Philosophy Departments, CS students must still ensure that they meet the requirement that at least 12 units of electives are taken from the School of Computer Science. CS/PAL students are also expected to participate in the

activities of the Carnegie Mellon Logic Community, such as relevant seminars and colloquia.

Completion of all degree requirements earns the student a Ph.D. in Computer Science: Pure and Applied Logic. More information about the PAL program is available at `http://logic.cmu.edu`.

B.3   Center for Neural Basis of Cognition Training Program

The CNBC Training Program is an interdisciplinary Ph.D. and postdoctoral training program operated jointly with several academic departments at Carnegie Mellon and the University of Pittsburgh. Other affiliated departments at CMU are Biological Sciences, Machine Learning, Psychology, Robotics, and Statistics. Affiliated departments at the University of Pittsburgh are Mathematics, Neurobiology, Neuroscience, and Psychology.

The CNBC option for Computer Science Ph.D. students allows them to combine intensive training in CS with a broad exposure to cognitive science, neural computation, and other disciplines that touch on problems of higher brain function.

Course of Study: CS/CNBC students are admitted through their home department (Computer Science) and fulfill the normal CS Ph.D. program requirements. In addition, they are required to take a sequence of CNBC core courses in neurophysiology, systems neuroscience, computational neuroscience, and cognitive neuroscience. The CNBC core courses take the place of the two elective course unit requirement in CS. CS/CNBC students also participate in a research seminar series and experience a lab rotation.

Because of the extra time required to complete the CNBC requirements, students may apply for one year of financial support from the CNBC. In addition, CS/CNBC students are given an annual travel allowance to help them attend conferences and workshops.

Completion of all degree requirements earns the student a Ph.D. in Computer Science plus an additional certificate in the "Neural Basis of Cognition." More information about the CNBC option is available at `http://www.cnbc.cmu.edu/`.

C   Dual Degree Program with Portugal

Since Fall 2007 the department also offers a dual degree program in cooperation with several Portuguese universities. The regulations are essentially the same as given in this document, except that some requirements can be fulfilled in an affiliated program in Portugal. For more information, see
`http://www.csd.cs.cmu.edu/education/phd/portugal.html`.

D   Self-Defined Interdisciplinary Ph.D. Programs

We encourage students to follow their interests and to pursue interdisciplinary contacts as appropriate for their program of research and study. The doctoral program is broad and flexible, so usually we can find ways to accommodate these interests. However, there are times when a student's research goes so far afield that an interdisciplinary Ph.D. would be more appropriate. The department accommodates these students by allowing a self-defined interdisciplinary Ph.D. program.

A student interested in a self-defined Ph.D. sets it up between Computer Science and another academic department. The student must draw up a description of the area in which they wish to work and a proposed academic plan, which typically includes coursework, a description of the qualifier (if any), and how the thesis will be approved. The student then must put together a program committee consisting of faculty from both departments who will agree to oversee the student's progress through the program; this committee acts as the student's department. Finally, the program must be approved by the DRC and by the equivalent committee of the other department.

The process of setting up an interdisciplinary Ph.D. is not easy and can easily take a year or two. The process by which an interdisciplinary Ph.D. is created is unfamiliar to most other departments and is not well-defined by the university itself, so it may take significant effort to define an interdisciplinary degree and have it be recognized in all participating departments. It is therefore in most students' interests to stay within the Computer Science program; once coursework is done, there are few limitations on a Computer Science Ph.D. student's course of study, thereby giving the student nearly the same flexibility achievable through a self-defined program.

E Key offices for Graduate Student Support

E.1 Office of the Assistant Vice Provost for Graduate Education

http://www.cmu.edu/graduate   E-Mail: grad-ed@cmu.edu

The Office of the Assistant Vice Provost for Graduate Education, AVPGE, directed by Suzie Laurich-McIntyre, Ph.D., Assistant Vice Provost for Graduate Education, provides central support for graduate students in a number of roles. These include being an ombudsperson and resource person for graduate students as an informal advisor; resolving formal and informal graduate student appeals; informing and assisting in forming policy and procedures relevant to graduate students; and working with departments on issues related to graduate students and implementation of programs in support of graduate student development.

The Office of the AVPGE often collaborates with the division of Student Affairs to assist graduate students with their Carnegie Mellon experience. Senior members of the student affairs staff are assigned to each college (college liaisons) and are often consulted by the Assistant Vice Provost for Graduate Education and departments on an individual basis to respond to graduate student needs.

The Office of the Assistant Vice Provost for Graduate Education (AVPGE) offers a robust schedule of professional development opportunities. Some are geared towards a specific population (master?s students, PhD students at the beginning of their program, graduate students seeking tenure track positions, etc.) and others are open to all graduate students (time management, balancing, staying healthy). A full schedule of programs is at http://www.cmu.edu/graduate/.

The Office of the AVPGE also coordinates several funding programs, and academically focused seminars and workshops that advise, empower and help retain all graduate students. The fundamental goals of our programs have been constant: first, to support, advise and guide individual graduate students as they work to complete their degrees; second, to contribute to the greatest degree possible to the diversification of the academy. Visit the Graduate Education website for information about:

- Conference Funding Grants

- Graduate Small Project Help (GuSH) Research Funding

- Graduate Student Professional Development: seminars, workshops and resources

E.2 Office of the Dean of Student Affairs

`http://www.cmu.edu/student-affairs/index.html`

The Office of the Dean provides central leadership of the meta-curricular experience at Carnegie Mellon. The offices that fall under the division of Student Affairs led by Vice President and Dean of Student Affairs Gina Casalegno, include (not an exhaustive list):

- Athletics

- Career and Professional Development Center

- Cohon University Center

- Counseling & Psychological Services (CaPS)

- Dining Services

- Housing Services

- Office of Community Standards and Integrity

- Office of Student Leadership, Involvement, and Civic Engagement

- University Health Services

- Wellness Initiatives

Graduate students will find the enrollment information for **Domestic Partner Registration** and **Maternity Accommodations** in the Office of the Dean of Student Affairs and on the website. The Office of the Dean of Student Affairs also manages the **Emergency Student Loan** (ESLs) process. The Emergency Student Loan service is available through generous gifts of alumni and friends of the university. The Emergency Student Loan is an interest-free, emergency-based loan repayable within 30 days. Loans are available to enrolled students for academic supplies, medication, food or other expenses not able to be met due to unforeseeable circumstances.

The Office of Integrity and Community Standards also provides consultation, support, resources and follow-up on questions and issues of Academic Integrity: `http://www.cmu.edu/academic-integrity`.

E.3 Center for Student Diversity & Inclusion

`https://www.cmu.edu/student-diversity/`

Diversity and inclusion have a singular place among the values of Carnegie Mellon University. The Center for Student Diversity & Inclusion actively cultivates a strong, diverse and inclusive community capable of living out these values and advancing research, creativity, learning and development that changes the world.

The Center offers resources to enhance an inclusive and transformative student experience in dimensions such as access, success, campus climate and intergroup dialogue. Additionally, the Center supports and connects historically underrepresented students and those who are first in their family to attend college in a setting where students? differences and talents are appreciated and reinforced, both at the graduate and undergraduate level. Initiatives coordinated by the Center include, but are not limited to:

- First generation/first in family to attend college programs

- LGBTQ+ Initiatives

- Race and ethnically-focused programs, including Inter-University Graduate Students of Color Series (SOC) and PhD SOC Network

- Women?s empowerment programs, including Graduate Women?s Gatherings (GWGs)

- Transgender and non-binary student programs

E.4 Assistance for Individuals with Disabilities

http://www.cmu.edu/education-office/disability-resources/

The Office of Disability Resources at Carnegie Mellon University has a continued mission to provide physical and programmatic campus access to all events and information within the Carnegie Mellon community. We work to ensure that qualified individuals receive reasonable accommodations as guaranteed by the Americans with Disabilities Act (ADA) and Sections 503 and 504 of the Rehabilitation Act of 1973. Students who would like to receive accommodations can begin the process through Voluntary Disclosure of Disability Form or email access@andrew.cmu.edu to begin the interactive accommodation process.

Students with disabilities are encouraged to self-identify with the Office of Disability Resources by contacting Catherine Getchell, 412-268-6121, getchell@cmu.edu to access the services available at the university and initiate a request for accommodations.

E.5 Eberly Center for Teaching Excellence & Educational Innovation

http://www.cmu.edu/teaching

Support for graduate students who are or will be teaching is provided in many departments and centrally by the Eberly Center for Teaching Excellence & Educational Innovation. The Eberly Center offers activities for current and prospective teaching assistants as well as any graduate students who wish to prepare for the teaching component of an academic career. The Center also assists departments in creating and conducting programs to meet the specific needs

of students in their programs. Specific information about Eberly Center support for graduate students can be found at: `http://www.cmu.edu/teaching/graduatestudentsupport/index.html`.

E.6 Carnegie Mellon Ethics Hotline

`http://www.reportit.net`

The health, safety and well-being of the university community are top priorities at Carnegie Mellon University. CMU provides a hotline that all members of the university community should use to confidentially report suspected unethical activity relating to financial matters, academic and student life, human relations, health and campus safety or research.

Students, faculty and staff can anonymously file a report by calling 877-700-7050 or visiting reportit.net (user name: tartans; password: plaid). All submissions will be reported to appropriate university personnel.

The hotline is NOT an emergency service. For emergencies, call University Police at 412-268-2323.

E.7 Graduate Student Assembly (GSA)

`http://www.cmu.edu/stugov/gsa/index.html`

The Carnegie Mellon Student Government consists of an Executive Branch and a Legislative Branch. This is the core of traditional student government, as governed by the Student Body Constitution. The Executive Branch serves the entire student body, graduate and undergraduate, and consists of one president and four vice-presidents. The Legislative Branch for graduate students, The Graduate Student Assembly (GSA) passes legislation, allocates student activities funding, advocates for legislative action locally and in Washington D.C. on behalf of graduate student issues and needs, and otherwise acts on behalf of all graduate student interests. GSA also contributes a significant amount of funding for conferences and research, available to graduate students through application processes managed by the Office of the Assistant Vice Provost for Graduate Education. GSA also plans various social opportunities for graduate students and maintains a website of graduate student resources on and off-campus, `http://www.cmu.edu/stugov/gsa/resources`. Each department has representation on GSA and receives funding directly from GSAs use of the student activities fee for departmental activities for graduate students. The department rep(s) is the main avenue of graduate student representation of and information back to the graduate students in the department.

E.8 Intercultural Communication Center (ICC)

`http://www.cmu.edu/icc/`

The Intercultural Communication Center (ICC) is a support service offering both credit and non-credit classes, workshops, and individual appointments designed to equip nonnative English speakers (international students as well as in-

ternational students who attended high school and/or undergraduate programs in the U.S.) with the skills needed to succeed in academic programs at Carnegie Mellon. In addition to developing academic literacy skills such as speaking, reading and writing, students can learn more about the culture and customs of the U.S. classroom. The ICC also helps international teaching assistants (ITAs) who are non-native English speakers develop fluency and cultural understanding to teach successfully at Carnegie Mellon and provides ITA testing, required testing indicating a nonnative speaking student has a language proficiency required before being allowed to work with undergraduates in classes, labs or individual meetings.

E.9 Office of International Education (OIE)

http://www.cmu.edu/oie/

Carnegie Mellon hosts international graduate and undergraduate students who come from more than 90 countries. Office of International Education (OIE) is the liaison to the University for all non-immigrant students and scholars. OIE provides many services including: advising on personal, immigration, academic, social and acculturation issues; presenting programs of interest such as international career workshops, tax workshops, and cross-cultural and immigration workshops; supporting international and cultural student groups such as the International Student Union and the International Spouses and Partners Organization; maintaining a resource library that includes information on cultural adjustment, international education and statistics on international students in the United States; posting pertinent information to students through email and the OIE website, and conducting orientation programs.

E.10 Veterans and Military Community

http://www.cmu.edu/veterans/

Military veterans are a vital part of the Carnegie Mellon University community. Graduate students can find information on applying veteran education benefits, campus services, veterans groups at CMU, non-educational resources and international military service information through the Veterans and Military Community website. There are also links and connections to veteran resource in the Pittsburgh community. The Naval ROTC and Veteran Affairs Offices are located at 4615 Forbes Avenue, uro-vaedbenefits@andrew.cmu.edu, 412-268-8747.

F Key Offices for Academic & Research Support

F.1 Computing and Information Resources

`http://www.cmu.edu/computing`

Computing Services provides a comprehensive computing environment at Carnegie Mellon. Graduate students should seek Computing Services for information and assistance with your Andrew account, network access, computing off-campus, campus licensed software, email, calendar, mobile devices, computer security, cluster services and printing. Computing Services can be reached at it-help@cmu.edu.

The Carnegie Mellon Computing Policy establishes guidelines and expectations for the use of computing, telephone and information resources on campus. The policy is supported by a number of guidelines graduate students should know. The policy and guidelines are available at: `http://www.cmu.edu/computing/guideline/index.html`.

F.2 Research at CMU

`http://www.cmu.edu/research/`

The primary purpose of research at the university is the advancement of knowledge in all fields in which the university is active. Research is regarded as one of the university's major contributions to society and as an essential element in education, particularly at the graduate level and in faculty development. Research activities are governed by several university policies. Guidance and more general information is found by visiting the Research at Carnegie Mellon website.

F.3 Office of Research Integrity & Compliance

`http://www.cmu.edu/research-compliance/index.html`

The Office of Research Integrity & Compliance (ORIC) is designed to support research at Carnegie Mellon University. The staff work with researchers to ensure research is conducted with integrity and in accordance with federal and Pennsylvania regulation. ORIC assists researchers with human subject research, conflicts of interest, responsible conduct of research, export controls, intellectual property rights and regulations, and institutional animal care & use. ORIC also consults on, advises about and handles allegations of research misconduct.

G Key Offices for Health, Wellness & Safety

G.1 Counseling & Psychological Services

`http://www.studentaffairs.cmu.edu/counseling`

Counseling & Psychological Services (CAPS) affords the opportunity for students to talk privately about issues that are significant for them in a safe, confidential setting. Students sometimes feel confused about why they are feeling upset and perhaps confused about how to deal with it. An initial consultation with a CAPS therapist will clarify options and provide a recommendation to the appropriate mental health resource at Carnegie Mellon or the larger Pittsburgh community. CAPS services are provided at no cost. Appointments can be made in person or by telephone, 412-268-2922.

G.2 Health Services

`http://www.cmu.edu/HealthServices/`

University Health Services (UHS) is staffed by physicians, advanced practice clinicians and registered nurses who provide general medical care, allergy injections, first aid, gynecological care and contraception as well as on-site pharmaceuticals. The CMU student insurance plan covers most visit fees to see the physicians and advanced practice clinicians & nurse visits. Fees for prescription medications, laboratory tests, diagnostic procedures and referral to the emergency room or specialists are the student?s responsibility and students should review the UHS website and their insurance plan for detailed information about the university health insurance requirement and fees.

UHS also has a registered dietician and health promotion specialists on staff to assist students in addressing nutrition, drug and alcohol and other healthy lifestyle issues. In addition to providing direct health care, UHS administers the Student Health Insurance Program. The Student Health Insurance plan offers a high level of coverage in a wide network of health care providers and hospitals. Graduate students should contact UHS to discuss options for health insurance for spouses, domestic partners and dependents. Appointments can be made by visiting UHS?s website or by telephone, 412-268-2157.

G.3 Campus Wellness

`https://www.cmu.edu/wellness/`

At the university, we believe our individual and collective well-being is rooted in healthy connections to each other and to campus resources. The university provides a wide variety of wellness, mindfulness and connectedness initiatives and resources designed to help students thrive inside and outside the classroom. The BeWell@CMU e-newsletter seeks to be a comprehensive resource for CMU regarding all wellness-inspired events, announcements and professional and personal development opportunities. To sign up for the e-newsletter, text BEWELLATCMU to 22828 and share your preferred email address.

G.4   University Police

`http://http://www.cmu.edu/police/`

412-268-2323 (emergency only), 412-268-6232 (non-emergency)

The University Police Department is located at 300 South Craig Street, Room 199 (entrance is on Filmore Street). The department's services include police patrols and call response, criminal investigations, shuttle and escort services (additional information included in the Parking and Transportation section of The WORD, see below), fixed officer and foot officer patrols, event security, and crime prevention and education programming. Visit the department's website for additional information about the staff, escort and shuttle, emergency phone locations, crime prevention, lost and found, finger print services, and annual statistic reports.

Carnegie Mellon University publishes an annual campus security and fire safety report describing the university's security, alcohol and drug, sexual assault, and fire safety policies and containing statistics about the number and type of crimes committed on the campus and the number and cause of fires in campus residence facilities during the preceding three years. Graduate students can obtain a copy by contacting the University Police Department at 412-268-6232. The annual security and fire safety report is also available online at `http://www.cmu.edu/police/annualreports`.

G.5   Shuttle & Escort Service

University Police coordinates the Shuttle Service and Escort Service provided for CMU students, faculty, and community. Full information about these services, stops, routes, tracking and schedules can be found online at: `http://www.cmu.edu/police/shuttleandescort/`

H   The WORD

`http://www.cmu.edu/student-affairs/theword/`

The WORD is Carnegie Mellon University's student on-line handbook and is considered a supplement to the department (and sometimes college) handbook. The WORD contains campus resources and opportunities, academic policy information and resources, community standards information and resources. It is designed to provide all students with the tools, guidance, and insights to help you achieve their full potential as a member of the Carnegie Mellon community.

University policies can also be found in full text at: `http://www.cmu.edu/policies/`

University appendices E through H last updated: June 14, 2016 - Provided by the Assistant Vice Provost for Graduate Education