Master of Science in Computer Science

Student Handbook

2016-2017

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Director's Welcome


Karl Crary, Director

As the Director of the Master's of Science in Computer Science program, I am excited to welcome each of you. Although this program is among our newest, as one of its graduates, you will be immediately recognized as one among the finest computer scientists in the world. You will be part of the elite network of Carnegie Mellon computer science alumni dating back to our first graduate program in 1965.

Our curriculum charts a challenging course designed to ensure that you will develop a rich base in computer science, as well as depth and rigor that will enable you to become a technical leader. You will find compelling lectures by the world-renowned researchers and experts, thought-provoking readings, and projects of scale and complexity. You may have the opportunity to intern in the summer with leaders in industry or top-flight research groups on and off campus. By graduation you will find that you have developed an agile ability in computational thinking that will serve you across domains in the ever-changing landscape of your dynamic career.

Throughout the program, you won't be alone. You'll be supported by an engaged faculty, dedicated teaching assistants, and among the talented and collaborative group of your peers. You will have the guidance of academic and career advisors. You'll find that the best part of the program at Carnegie Mellon is the tremendous group of people that it brings together.

If you are new to Pittsburgh, you'll find it to be a wonderful place to live. As a collection of neighborhoods, hosting world-class industries, medical centers, and institutions of higher learning, Pittsburgh offers the convenience of small town living with the richness and diversity of an international city.

If I can be of service, please feel free to email (crary@cs.cmu.edu) or make an appointment to speak with me by contacting Tracy Farbacher, the program administrator. She can be reached by email (tracyf@cs.cmu.edu) or telephone (412-268-8824). We are at your service.

Program History

"Computing at Carnegie Mellon evolved the way it should everywhere but doesn't. There was a confluence of minds, tools and problems…and an appreciation of potential and consequences that spread far..."

—Alan Perlis, First Department Head

Alan Perlis
First Department Head

Led by a group of visionary enthusiasts, including Allen Newell, Herbert Simon, and Alan Perlis, the Department of Computer Science was formed in July 1965, with Alan Perlis as its head. As one of the first such departments in the nation, its creation was what now seems an inevitable step. From the very beginning, Computer Science at Carnegie Mellon was interdisciplinary and, in fact, drew its early strength from this meshing of students and faculty from the component disciplines. It was clear that an expansive approach to the field, fueled with solid science and a focus on the training of a new generation of scientists, would best serve the purpose of our campus and the industrial/academic community at large. This was a budding field, and Carnegie Mellon would be serving a critical role in populating the discipline with "trained professionals" who would be able to expand the parameters of what a computer could do and be used for.

Since its founding in 1965, the original department grew to form the School of Computer Science (SCS), which blossomed to encompass eight diverse units: the Computer Science Department (CSD), The Robotics Institute (RI), The Human-Computer Interaction Institute (HCII), The Language Technologies Institute (LTI), the Machine Learning Department (MLD), the Institute for Software Research (ISR), the Entertainment Technology Center (ETC), and the Computational Biology Department (CBD).

After many years of discussion and more than a year of detailed planning, the Computer Science Department launched the MS program in Computer Science. The first class was admitted in the spring of 2012 and graduated in the winter of 2013.

Program Overview

The MS program in Computer Science offers students with a Bachelor's degree the opportunity to improve their training with advanced study in Computer Science. We cater to students with basic analytic skills and a strong aptitude for mathematics, programming, and logical reasoning. An undergraduate degree in computer science is not required.

The program is not based on a fixed set of courses. Instead, students construct their own course of study, in consultation with their advisors, within broad guidelines. Thus, a student may choose an area in which to specialize (such as networking, machine learning, or algorithms) or choose not to specialize at all. Carnegie Mellon faculty conduct research in diverse areas within the computer sciences and, when there is mutual interest, provide opportunities to Masters students to participate in research, and related activities such as publications, the preparation and defense of a Masters thesis, &c.

Most students will complete the program in three semesters. Students switching into Computer Science from another field may require additional time to fill in gaps in their undergraduate training.

The program is distinct from the Doctoral program in Computer Science: Master's students will not necessarily continue into the Doctoral program. M.S. graduates are welcome to apply to the Ph.D. program, but will not receive preferential treatment.

Program Orientation

Orientation is mandatory and is held the Wednesday before the start of classes: Wednesday, August 24, 2016. Please plan to attend the entire orientation event. Do not make other plans for any portion of this day: morning, afternoon, or evening.

During the orientation event, we will do our very best to welcome you to campus and the city, and to help you feel at home here, and get to meet your colleagues and key people on campus. We will review important policies, discuss important campus and community resources and resources, and help you to understand Carnegie Mellon's rich academic culture and traditions. We will help you get registered for classes.

Selecting and Registering for Classes

You will be contacted by an Academic Advisor prior to your arrival on campus. Your Academic Advisor will discuss your background, academic interests, career interests, and goals with you. Together with your Academic Advisor, you'll select courses for the fall semester.

You will register for classes before the first day of classes. Orientation is a convenient opportunity. Though rare, it is possible that some of your preferred classes will have

wait lists. These usually get sorted out within the first few days of classes. Your Academic Advisor can help you understand the likely impact upon your intended schedule of being waitlisted for a course.

About This Document

This document will describe the curricular requirements of the program and will then present some academic and administrative policies that will govern your time here. It will also refer you to various sources of policy, information, and support outside the program itself. Please read through all of it carefully.

Curriculum

The Master of Science program in Computer Science gives students advanced study in Computer Science. The program is not based on a detailed required curriculum. Instead, students create their own course of study in consultation with their advisor.

Students must satisfy four (4) Requirements:

- **Units**: 108 units (as described below)
- **Breadth**: At least one pre-approved 9-12 unit course in each of three areas: AI, Systems, and Theory. In each area many courses are listed as pre-approved. Others may be approved on a per-student case-by-case basis, as the Program may deem consistent with the student's academic plan.
- **Qualifying**: At least 96 units in approved graduate or advanced undergraduate classes.
- **Free electives**: Up to 12 units may be in otherwise unapproved graduate-level courses at Carnegie Mellon or otherwise unapproved courses, at any level, within CSD.

Breadth Areas: AI, Systems, Theory

- Any course specifically listed by the Program as a pre-approved course in the specific breadth area (see Appendix)
- Any course pre-approved by the Program on a case-by-case basis, based upon consideration of the syllabus and/or other descriptive materials, the spirit of the requirement, and the student's individual academic plan.

Qualifying Courses

- Any graduate course offered by the Computer Science Department (15-6xx and higher), except courses without prescribed content, such as independent studies or research courses, or courses in computer science intended for other than computer scientists, i.e. 15-650.
- Any course specifically listed by the Program as a pre-approved Qualifying course (see Appendix)
- Any course approved by the Program for an individual student, based upon that student's proposed course of study. Such courses might, for example, include independent study or research courses, or courses offered by other departments.
- Although there is no guarantee, and permission must be obtained by each student in each instance, the MS in CS Program will often approve graduate-level and 4xx-level courses offered by other programs within SCS or ECE, within the offering program's area of specialization, intended for and qualifying for the offering program's own MS and/or Doctoral students.

Courses Without Prescribed Content

- Examples include independent studies, practicum, and/or research courses
- Regardless of offering department, these courses count as Free Electives, unless specifically pre-approved, in each instance, as Qualifying or a Breadth area.
- In general, no more than 12 units of such courses will be accepted as requirements satisfying, even across multiple categories.
- Students completing a thesis may be an example of a special case and approved by the Program, as appropriate, to receive 12-24 Qualifying units for associated self-defined courses. In these cases, credit beyond 12 units is typically awarded only upon acceptance of the thesis.

Participation in Research and the Thesis Option

If you happen to be interested in research, you'll be glad to know that Carnegie Mellon is an environment rich with world-leading researchers engaged in scholarly work across the diverse spectrum of the computer sciences.

Your Academic Advisor and your course professors are your primary points of contact to find research opportunities. By working through them, you will be able to contact interested researchers and research groups directly, without wasting your time and energy, and that of others, by contacting those that are not a good fit for you or likely to accept new students within a timeframe of interest to you. Unless they have solicited such requests, it is considered extremely poor form to contact researchers or research groups without getting an introduction from a professor who knows you well, your Academic Advisor, or the Program Director. In any case, keep your Academic Advisor up-to-date on your research plans, needs, and progress.

In some cases, for students with clear prior interests or prior interactions with Carnegie Mellon faculty members, the Program may initiate this process before matriculation or even admission. But, in the overwhelming majority of cases, in order to ensure students take the opportunity to focus on coursework and become oriented to Carnegie Mellon's research landscape, it is not begun until toward the end of the first Fall semester.

Students who wish to undertake a Master's thesis may, after becoming oriented in a research group or developing a rapport with an individual researcher, propose thesis research. Some students complete thesis research (including a written dissertation and a public thesis defense) in a single semester via 24 units of 15-697 (Graduate Reading and Research). Other students split the research into two semesters, typically 12 units of 15-689 (Independent Study in the Computer Sciences) followed by 12 units of 15-697. Registering for either course requires the approval by the Program of a written Proposal. A student registered for 15-697 must, to the satisfaction of the thesis committee, pass the public thesis defense and submit a final written dissertation by the deadline in order for 15-697 to count as a Qualifying course. With Program approval, some students may complete 12 units of 15-689 without continuing on to complete a thesis.

The office of the Assistant Vice Provost for Graduate Education administers several programs that offer small research grants to graduate students (more information at `http://www.cmu.edu/graduate`).

For further detail about the process associated with undertaking a thesis, please consult your academic advisor for the appropriate procedures and forms.

Practicum

For many students, internships, especially summer internships, are an integral part of graduate education in computer science. Students who so choose may formally include an internship into their course of study by registering for "15-691: Practicum." As with any course, the goals and expectations may be revised from time to time. At the time of writing, the course is described as below.

> *This 3-unit course is designed to both recognize and enhance the practical education of the internship experience. Students who wish to register for this course should submit to their Advisor a copy of their internship offer letter, as well as a personal statement describing their educational goals for the internship. The Advisor will confirm that the internship, the student's goals, and the program's educational goals are aligned and, once confirmed, approve the student to register for the course. Upon completion of the internship, the student must submit a reflection statement describing what they learned through the internship experience. The course grade is based upon the student's successful completion of the internship as well as the thoughtfulness and quality of expression shown in each of the two statements. Contact the Program Administrator or your Academic Advisor for guidance on writing the personal statement and reflection.*

Foundations

Many of the required courses require a level of competency in foundational areas similar to that typically found in B.S. in CS graduates at Carnegie Mellon. Those lacking this background should discuss scheduling dependencies and explore the possibility of a 4-semester schedule, including a foundational semester, with their Academic Advisor. The following areas and related courses are commonly of interest:

- Imperative or Object-Oriented Programming: Understanding of the object-oriented or imperative programming paradigms and confidence in software design and implementation in a corresponding compiled language, such as C, C++, or Java. [Mitigate with 15-122 + 15-213/513]
- Functional Programming: Understanding of the functional programming paradigms and confidence programming in a corresponding language, such ML, Haskell, or OCaml. [Mitigate with 21-127, and possibly 15-210]
- Fundamental Data Structures and Asymptotic Analysis: Ability to implement and efficiently use fundamental data structures and algorithms, such as lists, trees, sorts, searches, hash tables, as well as the ability to for basic asymptotic analysis, e.g., Big-O, of their operations [Mitigate with 15-650 or 15-122 or 15-150+15-210 or 08-722]
- System Programming: The ability to use debuggers and read assembly to analyze programs, to use processes and threads as a tool for concurrent and/or expressive programming, to manage concurrency, and to use an understanding of system design, such as memory hierarchy, to improve program performance [Mitigate with 15-213/513]
- Mathematical Theory: Exposure to elementary number theory, induction, the algebra of sets, equivalence relations, congruencies, recurrence equations, graph theory, and the methods of mathematical proof. [Mitigate with 21-127]
- Theory of Probability: Background in probability spaces, random variables, expectations, conditional probability and independence, limit theorems such as the strong law of large numbers and the central limit theorem, random walks [Mitigate with CMU OLI Probability & Statistics or 21-325 or 36-225]

University Policies and Guidelines

It is the responsibility of every 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: `http://www.cmu.edu/student-affairs/theword/`
- Academic Integrity Website: `http://www.cmu.edu/academic-integrity`
- University Policies Website: `http://www.cmu.edu/policies/`
- Graduate Education Website: `http://www.cmu.edu/graduate/policies/`

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.

Academic Policies

Passing Grades

A passing grade is C or higher, regardless of the home department or level of the course. A passing grade is required for a course to count toward the Requirements or to serve as a prerequisite for another course. The University's grading policy is available at:

`http://www.cmu.edu/policies/student-and-student-life/grading.html`

Minimum QPA

During each semester, students must achieve each of a 3.0 QPA across all courses taken during the semester and also a 3.0 QPA in Qualifying Courses. Furthermore, students must maintain a minimum of a 3.0 QPA cumulatively across all semesters.

Dean's List

Each semester, the Director, or designee, may nominate students to the Dean for inclusion on the Dean's List, which recognizes those students with the highest level of academic achievement. The nomination is according to criteria established from time-to-time by the Director. At the time of this writing, the Director nominates those full-time students who earn "A" grades (A+, A, A-) in all Requirements satisfying classes taken during the semester for which the nomination is being made.

Academic Advising

Students are required to review their academic plans and proposed schedules with their assigned Academic Advisor prior to registering for classes and prior to adding or dropping any courses intended to be used to satisfy Requirements.

Registration, Adding and Dropping Courses

Newly admitted students will receive information about course registration. The timetable for course registration, as well as for adding and dropping courses is set by the University as published in the official academic calendar, which can be found here:

`http://www.cmu.edu/hub/calendar.html`

Restricted Enrollment

Not all classes at Carnegie Mellon are open to all students. Some classes are restricted by program, by year, or by prerequisites. A few require permission of the instructor, portfolio reviews, auditions, etc. Some courses may have reservations governing how many students may enroll from particular programs or seniority levels. If you are encountering difficulty registering for a desired class, please see your Academic Advisor, who may (or may not) be able to help you register for certain courses within the School of Computer Science, and can often offer advice about similar or alternative courses, the likelihood of getting registered, etc.

Responsibility for Satisfying Requirements

It is the sole responsibility of the student to satisfy all requirements of the Program. The Director, Administrator, Advisors, and other faculty and staff, although sources of information and advice, are not responsible for notifying students of deficiencies in their academic plans or progress. Students are strongly encouraged to become familiar with the requirements and to review their progress each semester.

Satisfying Prerequisites

Some students may need to take additional courses that do not satisfy any program requirement, in order to satisfy pre-requisites for other courses. This is especially true for students with educational backgrounds other than traditional computer science degrees.

Based on our experience we expect and encourage students to take 15-513 or 15-213 (Introduction to Computer Systems) prior to taking required or elective systems classes, and, if possible, prior to arrival on campus in the fall. 15-513 has been especially designed to offer a low-unit, low-cost option for Master's students. It can be taken over the Internet during the summer prior to your first semester on campus.

Progress Toward Degree

Students with at least two remaining Requirements must register for, and maintain, a schedule that includes at least two courses that are Requirements or Prerequisites for Requirements.

Program Timeframe

The Program is designed to be completed in no more than four (4) semesters and in three (3) semesters by those with a sufficiently foundational and rigorous undergraduate education in computer science or strongly related field. As a consequence, students may not remain enrolled in the program for more than four (4) semesters, without the prior written or email permission of the Director.

Course Load

Because courses at Carnegie Mellon are very demanding, the program defines a maximum course load, which may be different for incoming and returning students. Academic Advisors can increase the maximum course load for an individual student, based upon that student's academic plan and achievement. Your academic advisor will increase your maximum course load, if needed, to allow you to register for any appropriate schedule. Please seek your Academic Advisor's guidance prior to registering, dropping, or adding classes.

Overlapping Courses

As attendance is expected in all courses, students are not permitted to enroll in courses that overlap in time. Please schedule only courses that you are able to attend.

Transfer of Credit From Other Institutions

Courses from other institutions may not be used to satisfy any requirement of the program. Certain courses taken at other institutions may be approved by the Director to satisfy prerequisite requirements for courses used to satisfy program requirements.

To request prerequisite credit please provide an official transcript documenting your participation and grade in the course, as well as the course syllabus, to the program Administrator. Once this is done, email the Director explaining your request. Your request is not approved until you have received written or email approval from the Director or Administrator.

Transferring Credit From Within Carnegie Mellon

Up to two courses taken at Carnegie Mellon prior to matriculation into the Master's program may be eligible to be counted toward the program requirements. These courses cannot satisfy any requirement, including a unit count requirement, of any degree or certification earned prior to, or concurrent with, any portion of the Master's program. To request such credit, please email the Director explaining your request. This email constitutes permission for the Director or designee to review your prior CMU academic records for this purpose. Your request is not approved until you have received written or email approval from the Director or designee.

Curricular Practical Training (CPT) and Optional Practical Training (OPT)

International students may be eligible to take part in paid summer internships via Curricular Practical Training (CPT) and to participate in Optional Practical Training (OPT) for up to 12 months during and after the Program, and may additionally qualify for a 17 month OPT extension post-graduation, under a special program for Science Technology Engineering and Mathematics (STEM). Government regulations are often nuanced and may change at any time. Interested students should contact their Academic Advisor and/or the Office of International Education for more information.

Grandfathering of Requirements

A student is generally bound to the Requirements in force at the time of matriculation, but may elect to satisfy any curriculum Requirements more recent than those under which they matriculated, e.g. a student matriculating in the 2014-2015 academic year may elect to satisfy the Requirements in force during the 2015-2016 academic year.

Because the Master's program is relatively short and in a relatively rapidly changing area, students returning from Leave or Suspension may not be able to return under the

same catalogue year, e.g., Requirements, under which they originally matriculated, as the supporting courses may no longer be offered or offered in their original form. Under these circumstances, the Director may approve exceptions to the prior Requirements or require that the returning student satisfy the requirements of more current Requirements, at the Director's option.

Additionally, the Director may revise the Requirements from time to time, so long as these revisions do not unreasonably impede the graduation of those in good standing. The Director may approve exceptions to revised requirements to mitigate the impact of revisions upon those affected.

Graduation and Award of Degree

The University's academic regulations govern graduation and the award of academic degrees, including the Master's in Computer Science. The Director shall not unreasonably withhold the certification for graduation of any candidate who satisfies the Requirements of the Program. But, strictly speaking, neither this certification nor this recommendation guarantee that the University shall award a degree. For example, the University may withhold degrees for individuals who have unsatisfied financial obligations.

Statute of Limitations

As outlined in the Master's Students Statute of Limitations on the Policy web site, students who have matriculated at Carnegie Mellon during or after the Fall semester of 2012 must complete all requirements for the master's degree within a maximum of seven years from original matriculation as a master's student. Once this time-to-degree limit has lapsed, the student may resume work towards a master's degree only if newly admitted to a currently offered master's degree program under criteria determined by that program.

Under extenuating circumstances, such as leave of absence, military or public service, family or parental leave, or temporary disability, a college/school may, upon the relevant department's recommendation and with the written approval of the dean (or designate), defer the lapse for a period commensurate with the duration of that interruption. Students who are pursuing the master's degree as part-time students for all semesters of their program, as approved by their program, may also appeal to their program or department for extension of the time to degree limit.

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.

Academic Integrity

The work you submit must be your own, unless you have clearly attributed it to others. You must not use the work of others without proper citation. And you must not use resources, including other persons, except as authorized by the course or project for which you are submitting the work. Such conduct might be accepted or commonplace elsewhere, but it is not here. Be careful. Be warned. Failure to abide by these rules, even just once, can result in your permanent separation from the University without refund of monies paid.

Please review the University's full policy here:

`http://www.cmu.edu/policies/student-and-student-life/academic-integrity.html`

Enforcement of Academic Policies

Any student who fails to achieve the minimum QPA, infringes the Academic Integrity policy, or otherwise fails to make appropriate progress toward graduation, falls out of Good Standing with the Program. The first time a student falls out of Good Standing, the student is subject to Academic Probation, which serves as a warning to the student and may also trigger supportive actions on the part of the Program, such as advising meetings and reduced maximum course loads.

If after one semester the student has not returned to Good Standing, or should a student fall out of Good Standing more than once during the course of the Program, the student is subject to Academic Suspension, which is a mandatory, but temporary, leave from the University. It serves as an opportunity for the student to re-evaluate goals, reflect on the requirements for success, and return to the University better prepared to succeed. Any student, who having ever previously been placed on Academic Suspension, fails to remain in Good Standing, may be Dismissed from the program (i.e., expelled). Dismissal indicates a complete and permanent separation of the student from the Program.

Students will receive official notice of academic actions, such as the imposition or removal of probation, in the form of a letter mailed to the "permanent address" on file with the University.

Administrative Policies

Program Director, Role of

The Director is responsible for the conduct of the Program. The Director has the power to interpret all policies and, with good cause, to grant exceptions to Requirements and policies, as well as to revise them. The Director has the power to delegate this authority.

Employment During Academic Year

The Program is designed to be full-time and Carnegie Mellon is very demanding. Students within the Program are not permitted employment by Carnegie Mellon during their first two full-time semesters at Carnegie Mellon. This includes, but is not limited to, positions such as paid teaching or research assistantships.

Students are permitted to conduct research, participate in teaching activities, etc., as unpaid volunteers or for course credit, so long as doing so does not interfere with academic performance or progress.

At the discretion of the Director students violating this policy may be suspended or dismissed from the Program.

Summer Employment/Internships

Students are encouraged to seek on and off campus opportunities for internships and other employment which reinforces and enhances scientific and professional development.

Please note that special procedures apply for international students. In particular, international students must consult with the Office of International Education (OIE) before agreeing to employment terms or signing an offer letter. Further details may be found beginning here:

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

Leave of Absence/Withdrawal

Matriculated students may voluntarily separate themselves from the University through two mechanisms. A "Leave of Absence" is a separation which is intended to be temporary. In other words, a student who requests a leaves of absence states that it is their intention to return in the future. A student may also "Withdraw" from the University, in which case the student is stating to the University that they are separating themselves from the University with no intention of returning.

Should the University choose to grant a student's request for a Leave of Absence, it may impose conditions upon the student's return. For example, should a student request and receive permission to take a Leave of Absence during a period of academic difficulty, the Program may require the student take particular courses upon return or take particular

steps to reinforce prerequisite material prior to return. These conditions, to the extent that they are known in advance, are documented on the request form prior to its approval.

The Program adheres to the University's procedures, policies, and process for leaves of absence and withdrawals. They can be found here:

http://www.cmu.edu/policies/student-and-student-life/student-leave.html

The Program adheres to the University's procedures, policies, and process with respect to the student's financial obligations as affected by leaves and withdrawals. These policies can be found here:

http://www.cmu.edu/hub/tuition/adjustment.html

Students who fail to meet required standards of academic achievement may be required to leave the University, either temporarily or permanently. The University policies governing these academic actions can be found here:

http://www.cmu.edu/policies/student-and-student-life/suspension-required-withdrawal-policy.html

Return from Leave of Absence

Students seeking to return from a Leave of Absence should contact their academic advisor to review their academic situation and academic plans and to ensure that any conditions that were set at the time the leave was granted are satisfied. The next step is to complete and submit the "Petition to Return from a Leave of Absence" Form (available from the HUB). This request should be completed at least one month prior to the start of the semester (more time is required for international students). Students may not return from a Leave of Absence until this petition is approved by the University.

Further information about the Carnegie Mellon University Student Return Policy can be found at the following website:

http://www.cmu.edu/policies/student-and-student-life/return-student.html

Program Transfer within CSD, SCS or CMU

Each degree program within Carnegie Mellon operates according to its own admissions process. Admission into one program does not guarantee admission into any other program, nor does it grant any preference.

Students within Carnegie Mellon seeking to transfer into the Master's Program should contact the Administrator for information about applying. Students within the Program who seek to transfer to another program at Carnegie Mellon should contact that program for information about their requirements and process.

Deferred Matriculation

Offers for admission into the Program are valid only for the academic year for which they are issued. There is no right to defer an admission offer. Should it be necessary to delay your entry to the Program, it may be necessary to reapply, including payment of any necessary fees. Should your circumstances necessitate a delay in your matriculation after your acceptance, please contact the Administrator or Director to request a deferral, which is granted solely at the discretion of the Program.

Full-time Status Requirement

Those students admitted with full-time status are, in general, required to carry a full-time course load, presently defined by the University as 36 units. Full-time students seeking to convert, temporarily or permanently, to part-time status may request approval from the Director. Because University policy generally prevents the conversion from part-time status to full-time status beyond the enrollment period at the beginning of the semester, status changes should occur only between semesters.

Under certain circumstances international students may be required to maintain full-time student status. International students must seek the advice of the Office of International Education (OIE) before assuming a part-time status, even if that status is approved by the program Director or Administrator.

Financial Obligations and Policies

It is essential that your tuition and other fees be paid on time. The University has a variety of mechanisms to sanction those with delinquent accounts, including withholding degrees, transcripts and registration.

Academic departments do not usually receive information about a student's financial situation, so we are unable to help you with financial difficulties and processes. Please contact the HUB for more information about financial policies, procedures, and practices:

http://www.cmu.edu/hub/

Privacy and FERPA

Under the Family Educational Rights and Privacy Act (FERPA), a student has the right to:

- Inspect and review his/her education records
- Request an amendment to his/her education records if the student believes they are inaccurate or misleading
- Request a hearing if his/her request for an amendment is not resolved to his/her satisfaction

- Consent to disclosure of personally identifiable information from his/her education records, except to the extent that FERPA authorizes disclosure without his/her consent
- File a complaint with the U.S. Department of Education Family Policy Compliance Office if he/she believes his/her rights under FERPA have been violated

Please review the University's full privacy policy:

http://www.cmu.edu/policies/student-and-student-life/privacy-rights-students.html

Enrollment Verification

Enrollment Services is the only University office that can provide an official letter of enrollment, official transcript, or enrollment verification. Enrollment verification can be requested online through The Hub at:

http://www.cmu.edu/hub/transcripts/verifications/enrollment.html

Intellectual Property

The Program incorporates the University's policy on intellectual property, which can be found here:

http://www.cmu.edu/policies/administrative-and-governance/intellectual-property.html

Assistance for Individuals with Disabilities

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 must submit a Voluntary Disclosure of Disability Form to access@andrew.cmu.edu to begin the interactive accommodation process.

For more information please see http://www.cmu.edu/hr/eos/disability/. Students with disabilities are encouraged to self-identify with Equal Opportunity Services by contacting Larry Powell, 412-268-2013, lpowell@andrew.cmu.edu to access the services available at the university and initiate a request for accommodations.

Maternity Accommodation Protocol

Students whose anticipated delivery date is during the course of a 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 Dean's Office staff to determine resources and procedures appropriate for the individual student. Planning for the student's discussion with her academic contact(s) (advisor, associate dean, etc.) will be reviewed during this meeting.

Harassment, Sexual Harassment

The free exchange of ideas, the confidence to work, to study, to innovate, and to perform, even the standards of discussion and performance to which the University is dedicated, are based upon an atmosphere of open trust and mutual respect - an atmosphere to which the intrusion of personal advantage or harassment, in any of its forms, can only be destructive.

Sexual harassment and sexual assault are prohibited by CMU, as is retaliation for having brought forward a concern or allegation in good faith. Any faculty member, staff employee, or student found to have violated the University's policies against harassment, including sexual harassment, will be subject to immediate and appropriate disciplinary action, including possible suspension, termination, or separation from the program or permanent expulsion from the University. The University's policy can be viewed in its entirety at:

`http://www.cmu.edu/policies/administrative-and-governance/sexual-harrassment-and-sexual-assault.html`

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

Incorporation of Applicable SCS and University Policies

This handbook describes policies unique to the Master's in Computer Science Program, as well as many University policies of interest to students within the Program. It is, however, not comprehensive. You can find applicable University-level policies here:

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

Additionally, the School of Computer Science and the Computer Science Department may adopt policies applicable to students within the Program.

Enforcement of Administrative Policies

Violations of Administrative policies, at the discretion of the Director, may result in sanctions including, but not limited to, probation, suspension or separation from the Program.

Appeals and Grievances

If you believe a grade, penalty, or administrative decision is unjust, or believe a situation is unreasonable or intolerable, you may wish to consult the *Summary of Graduate Student Appeal and Grievance Procedures* found here:

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

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.

Resources and Reference

Primary Contacts for the MSCS Program

If you have a question about how to accomplish a goal or procedure related to being an MSCS student, you should probably begin by contacting one of these four individuals.

Tracy Farbacher, Program Administrator

> 412-268-8824, GHC 9129, tracyf@cs.cmu.edu
> Tracy is responsible for the day-to-day administration of the Program. She is the first place you should turn for information about the Program, and can help you with most of your concerns or connect you with those who can.

David A. Eckhardt, Associate Program Director

> 412-268-6720, GHC 7717, david.eckhardt@cs.cmu.edu
> Prof. Eckhardt is the primary initial point of contact for any academic concerns, including academic advising and planning, class offerings, registration, research opportunities, teaching assistant opportunities, etc.

Julie Goldstein, Career Counselor

> 412-268-2064, West Wing 224A, jgolds@andrew.cmu.edu
> Julie is a tremendous resource for students. She works alongside your academic advisor, and specializes in helping computer science students find job and internship opportunities, prepare for interviews, compare offers, and search for the right career path.

Karl Crary, Program Director

> 412-268-7687, GHC 9217, crary@cs.cmu.edu
> Prof. Crary is the Director of the Program and is ultimately responsible for the curriculum, policies, procedures, and practices. The best way to get in touch with him is to contact Tracy for an appointment or to email him directly.

Other Leadership Roles

The MSCS program is hosted by the School of Computer Science. Most students will not need to interact with the SCS leadership directly, but it is probably useful for you to know who is in which role.

> Frank Pfenning, Department Head, Computer Science Department
> Garth Gibson, Associate Dean, Master's Programs, School of Computer Science
> Andrew W. Moore, Dean, School of Computer Science

Finally, if you need academic or procedural advice from somebody outside of CS, you can contact the graduate student ombudsman:

> Suzie Laurich-McIntyre, Assistant Vice Provost for Graduate Education
> 412-268-7307, Warner Hall 533, slaurichmcintyre@cmu.edu

Career

The Career and Professional Development Center is an outstanding resource to guide you as you begin the process of thinking about internships and life after graduation. The career consultant for the School of Computer Science is Julie Goldstein (jgolds@andrew.cmu.edu). She is an excellent source of information about employers and opportunities, as well as a great resource as you prepare your résumé and prepare for interviews. Since the Master's program is intense, but short, you are encouraged to contact her during your first semester.

There are many career and internship fairs on campus, including the Technical Opportunities Conference (TOC) early in the fall semester, and the Employment Opportunities Conference (EOC) early in the spring semester.

For more information, and for information about additional resources, please do check the Center's Web portal:

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

International Students

The Office of International Education at Carnegie Mellon University is committed to supporting, promoting, and celebrating individuals in an intercultural environment. They advocate for and facilitate international and cross-cultural experiences, perspectives and initiatives. They also help international students with the process of coming into the United States and maintaining legal status here, as well as with the process of settling in within the United States and on campus.

Their Web site is a great resource and contains their contact information:

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

Academic Calendar

The Academic Calendar contains important dates, such as those of the registration periods, add and drop deadlines, University holidays and observances, and the final exam period. The Academic Calendar can be found here:

`http://www.cmu.edu/hub/calendar.html`

Computing

Carnegie Mellon has a rich computing environment, including OS X-, Linux-, and Windows- based computers, public printers, public wireless networking, and a large library of software licensed for use by students.

More information about these resources can be found on the Computing Services Web pages:

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

If you need assistance, you can contact the Help Center at 412-268-HELP or advisor@andrew.cmu.edu.

Parking

Parking on campus is largely based upon an annual fee-for-permit system, although there are a few short-term meters, and the East Campus garage accepts fee-per-use users at low-volume times, and is often free on evenings and weekends. For more information about parking on campus, please contact Parking and Transportation Services:

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

Housing

Carnegie Mellon offers on- and off- campus housing for students, and resources for finding housing in the community. For more information see the Housing Service information page for graduate students:

`http://www.cmu.edu/housing/graduate-students/`

University and Public Transit Systems

The Port Authority of Allegheny County (PAT) operates a system of buses and trains that serve the greater Pittsburgh area. Your University ID serves as a pass that allows you to ride most, if not all, of these services for free. You can find routes and schedules here:

`http://www.portauthority.org/paac/default.aspx`

The University provides a shuttle bus system that is a fixed route, fixed stop transportation option which is available to all CMU students, faculty, and staff. There are different shuttle buses which operate within the geographical areas which surround Carnegie Mellon. Presently, there are buses which service the Squirrel Hill, North Oakland and Shadyside areas. There are also shuttles serving Bakery Square (Google headquarters) and the PTC (Pittsburgh Technology Center).

The Escort Service is a transportation option that services the geographical areas surrounding Carnegie Mellon, to include Squirrel Hill, Shadyside, and Oakland. The service provides transportation from 9 designated campus pick-up locations to the

intersection closest to the rider's residence. The pick-up locations are marked by official university signage, bearing the word "Escort". The Escort Service is limited to a 1.5 mile radius from campus.

More information about shuttles and escort can be found here:

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

Police

University Police provide traditional security and police services on campus, as well as operate crime prevention programs, offer Rape Aggression Defense Systems (RADS) classes, fingerprinting services, and operate a lost and found. They can be reached by dialing 8-2323 from any campus phone. Their Web pages can be found here:

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

When off-campus, in order to contact the local police, call the emergency dispatcher by dialing 9-1-1 from any cellular or landline phone. To reach University Police while off-campus or from a cellular phone, dial 412-268-2323.

Emergency Medical Assistance

For emergency medical assistance on campus, call the University Police dispatcher at 412-268-2323. In most areas off campus, dialing 9-1-1 will put you in touch with an emergency dispatcher who can summon emergency medical assistance, e.g. an ambulance, for you.

Routine Medical and Health Care

University Health Services is the on-campus health center. It is available to provide students with routine health and medical care, and to help students find health and medical resources off-campus, when needed. Appointments can be made on-line and by phone. For more information, please consult their Web site:

`http://www.cmu.edu/health-services/`

Counseling and Psychological Services

Counseling and Psychological Services (CAPS) offers students the opportunity to talk privately about personal, academic, or other concerns in a safe, confidential setting. After an initial consultation with a CAPS therapist, students are referred to available mental health resources at Carnegie Mellon or in the larger Pittsburgh community.

For an appointment, call 412-268-2922 during regular office hours. *For emergencies, the phone is answered 24x7: every day, including holidays, at all hours of the day and night.* If you aren't sure whether a problem is "bad enough" for you to call after regular office hours, you should call and an expert will help you decide.

Ethics Hotline

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 `http://www.reportit.net` (username: "tartans"; password: "plaid"). All submissions will be reported to appropriate University personnel.

The Ethics Hotline is *not* an emergency service! To report an emergency, call University Police at 412-268-2323.

Emergency Loans

The Office of the Dean of Student Affairs offers short-term emergency loans for supplies, medication, food or other unexpected circumstances. The loans are interest-free and for short periods of time (not longer than a month).

Graduate Student Assembly (GSA)

The Graduate Student Assembly (GSA) is the primary campus-wide organization run by graduate students for graduate students. It is a vehicle for collaboration between graduate students and the University administration and the general student body, and is one element of the University's structured Student Government. One very notable role on campus is providing events for graduate students from across campus to take a break from their studies and research, get together, relax, and have some fun. More information about GSA and GSA events can be found on their Web page:

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

Conference/Travel Funding

Conference Funding is a funding application process provided by GSA and the Provost's Office for students to attend a conference, whether as a participant or as a presenter. The process is managed by the Office of the Assistant Vice Provost for Graduate Education. Information is available here:

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

ACADEMIC/ADMINISTRATIVE

1 Alumni House
2 Art Park
3a Baker Hall (Dietrich/H&SS)
3b Porter Hall
4 Bramer House
5 College of Fine Arts (CFA)
6 Cyert Hall
7 Doherty Hall
8 Facilities Management Services Building
9a Gates Center for Computer Science (SCS)
9b Hillman Center for Future-Generation Technologies (SCS)
10 Hamburg Hall (Heinz)
11 Hamerschlag Hall
12 Hunt Library
13 Margaret Morrison Carnegie Hall
14 Mellon Institute (MCS)
15 National Robotics Engineering Center* (NREC)
16 Newell-Simon Hall (SCS)
17 Pittsburgh Technology Center* (ETC)
18 Posner Center
19 Posner Hall (Tepper)
20 Purnell Center for the Arts
21 Rand Building
22 Roberts Engineering Hall
23 Robert Mehrabian Collaborative Innovation Center (RMCIC)
24 Scaife Hall (CIT)
25 Future Home of Sherman and Joyce Bowie Scott Hall
26 Skibo Gymnasium
27 Smith Hall
28 Software Engineering Institute (SEI)
29 Solar Decathlon House
30 University Center
31 Warner Hall (Office of Admission)
32 Wean Hall
33 Whitfield Hall (HR)
34 300 South Craig (Police)
35 311 South Craig
36 407 South Craig
37 4516 Henry (UTDC)
38 4609 Henry (Dietrich/H&SS Grad Labs)
39 4615 Forbes (GATP)
40 4616 Henry (INI)
41 6555 Penn*

RESIDENTIAL

42 Boss House
43 Doherty Apartments
44 Donner House
45 Fairfax Apartments
46 Fraternity/Sorority Quadrangle
47 Hamerschlag House
48 Henderson House
49 Margaret Morrison Apartments/Plaza
50 Margaret Morrison Fraternity/Sorority Houses
51 McGill House
52 Morewood Gardens (Housing Offices)
53 Mudge House
54 Neville Apartments
55 Resnik House
56 Roselawn Houses
57 Scobell House
58 Shady Oak Apartments
59 Shirley Apartments
60 Spirit House
61 Stever House
62 The Residence on Fifth
63 Webster Hall
64 Welch House
65 West Wing
66 Woodlawn Apartments
67 99 Gladstone
68 1094 Devon

PARKING

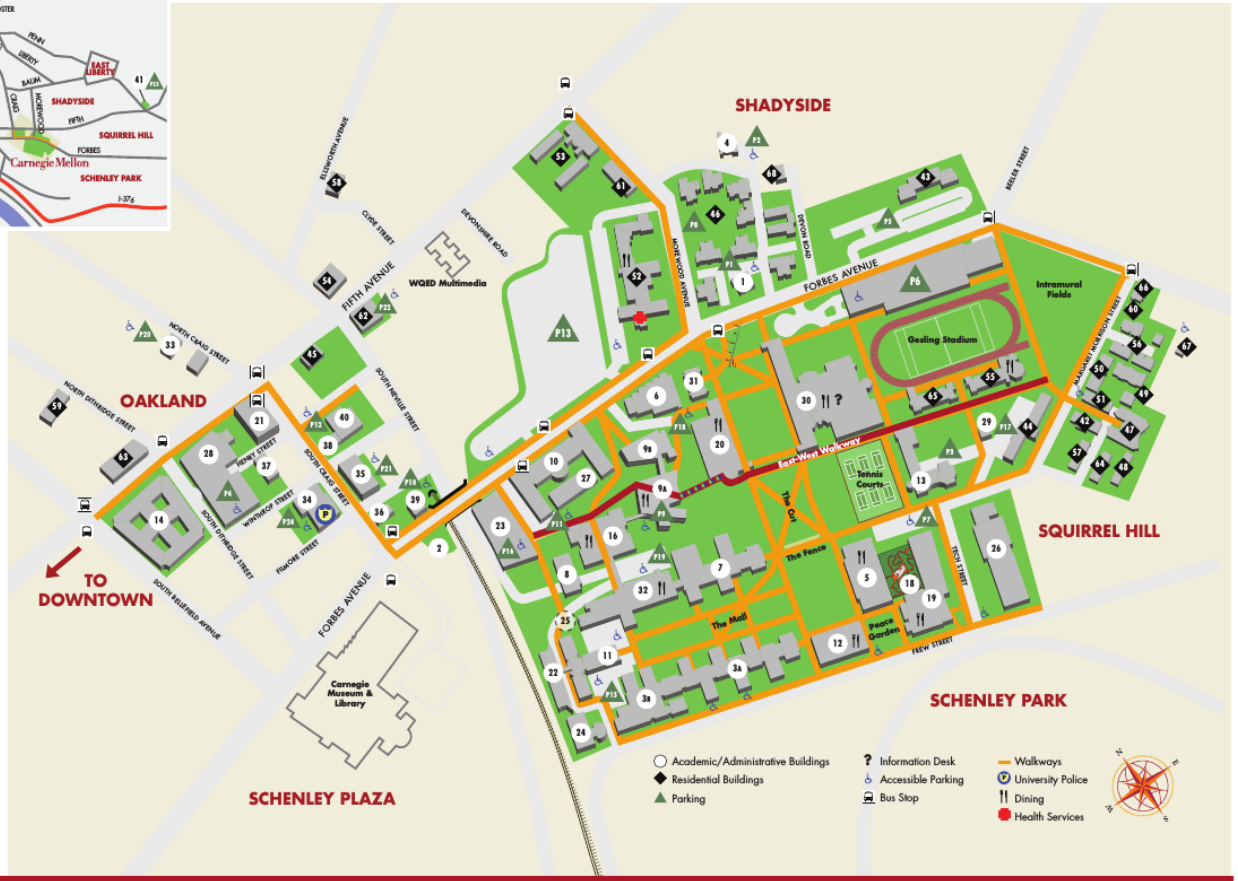
P1 Alumni House***
P2 Bramer House***
P3 Children's School
P4 Dithridge Street Garage**
P5 Doherty Apartments***
P6 East Campus Garage**|***
P7 Fine Arts
P8 Fraternities
P9 Gates Garage**|***
P10 GATP
P11 Hamburg Hall***
P12 Henry Street
P13 Morewood***|****
P14 Pittsburgh Technology Center* (ETC)
P15 Porter-Hamerschlag-Wean
P16 RMCIC Garage**
P17 Sororities
P18 Warner
P19 West Campus
P20 Whitfield Hall
P21 Zebina Way**
P22 4700 Fifth Avenue
P23 6555 Penn*
P24 300 South Craig

* Off campus, see inset
** Open to visitors 9 a.m.-5 p.m. Monday – Friday
*** Open to visitors after 5 p.m. and weekends
**** Parking meters

Additional on-street parking available on city streets.

Primary circulation routes and access parking areas are shown.

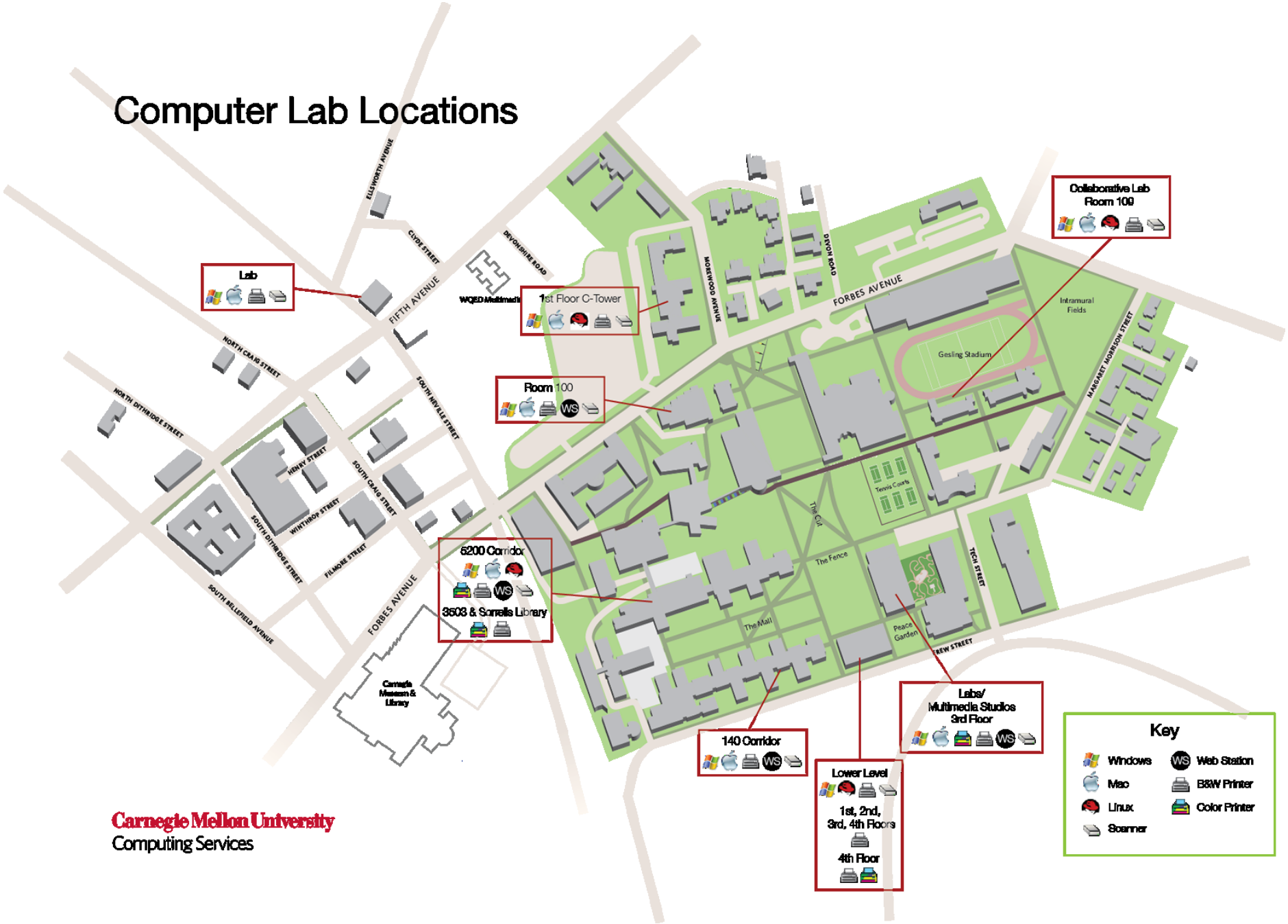
Revised October 2012



Campus Map

Carnegie Mellon University www.cmu.edu

Computer Lab Locations



Carnegie Mellon University
Computing Services

Appendix

Systems Courses, Pre-Approved

15-605 Operating Systems
15-611 Compiler Design
15-612 Operating System Practicum
15-615 Databases
15-618 Parallel Computer Architecture and Programming
15-640 Distributed Systems
15-641 Computer Networks
15-610 Engineering Distributed Systems
15-712 Advanced Operating Systems
15-740 Computer Architecture
15-744 Computer Networks
15-745 Optimizing Compilers
15-746 Advanced Storage Systems
15-821 Mobile and Pervasive Computing
15-826 Multimedia Databases and Data Mining

Theoretical Foundations Courses, Pre-Approved

15-652 Foundations of Programming Languages
15-657 Constructive Logic
15-614 Bug Catching: Automated Program Verification and Testing
15-624 Foundations of Cyber-Physical Systems
15-651 Algorithms
15-750 Graduate Algorithms
15-812 Programming Language Semantics
15-814 Type Systems for Programming Languages
15-817 Model Checking and Abstract Interpretation
15-853 Algorithms in the Real World
15-855 Complexity Theory
15-857 Performance Modeling
15-859 Randomized Algorithms

Artificial Intelligence Courses, Pre-Approved

10-601 Machine Learning
10-725 Optimization
15-780 Graduate Artificial Intelligence
15-781 Machine Learning
15-887 Planning, Learning and Execution
16-720 Computer Vision

Outside of CSD, Pre-approved as Qualifying

02-712 Computational Methods for Biological Modeling, Simulation
05-813 Human Factors
05-891 Designing Human-Centered Software
10-601 Machine Learning
10-702 Statistical Machine Learning
10-705 Intermediate Statistics
10-708 Probabilistic Graphical Models
10-725 Optimization
11-641/741 Information Retrieval
11-772 Analysis of Social Media
16-642 Manipulation, Mobility and Control
16-720 Computer Vision
16-811 Mathematical Foundations for Robotics
17-651 Models of Software Systems
17-654 Analysis of Software Artifacts
17-993 How to Write a Good Research Paper
18-730 Introduction to Computer Security
18-739 Foundations of Privacy and Security
18-741 Advanced Computer Architecture
18-742 Parallel Computer Architecture
18-756 Packet Switching and Computer Networks
18-847 Data Intensive Computation and Storage
21-701 Discrete Math
47-830 Integer Programming
47-834 Linear Programming
80-713 Category Theory

Graduate Courses Within CSD, Frequently Offered

15-605 Operating System Design and Implementation
15-610 Engineering Distributed Systems
15-611 Compiler Design
15-612 Operating System Practicum
15-617 HOT Compilation
15-618 Parallel Computer Architecture and Programming
15-637 Web Application Development
15-640 Distributed Systems
15-641 Computer Networks
15-651 Algorithms
15-652 Principles of Programming Languages

15-657 Constructive Logic
15-662 Computer Graphics
15-663 Computational Photography
15-666 Computer Game Programming
15-681 Machine Learning
15-685 Computer Vision
15-712 Advanced OS and Distributed Systems
15-740 Computer Architecture
15-744 Computer Networks
15-745 Optimizing Compilers for Modern Architecture
15-746 Advanced Storage Systems
15-749 Engineering Complex, Large-Scale Computer Systems
15-750 Graduate Algorithms
15-780 Graduate Artificial Intelligence
15-781 Machine Learning
15-782 Artificial Neural Networks
15-812 Programming Language Semantics
15-814 Type Systems for Programming Languages
15-816 Linear Logic
15-817 Introduction to Model Checking
15-821 Mobile and Pervasive Computing
15-826 Multimedia Databases and Data Mining
15-831 Statistical Techniques in Robotics
15-845 Current Research Issues in Computer Systems
15-851 Computation and Deduction
15-852 Computational Geometry
15-853 Algorithms in the Real World
15-855 An Intensive Introduction to Computational Complexity
15-857 Performance Modeling and Design of Computer System
15-859 Machine Learning Theory
15-859 Mathematical Games
15-867 The Animation of Natural Phenomena
15-879 Algorithms for Computational Structural Biology
15-883 Computational Models of Neural Systems
15-887 Planning, Execution and Learning
15-892 Foundations of Electronic Marketplaces