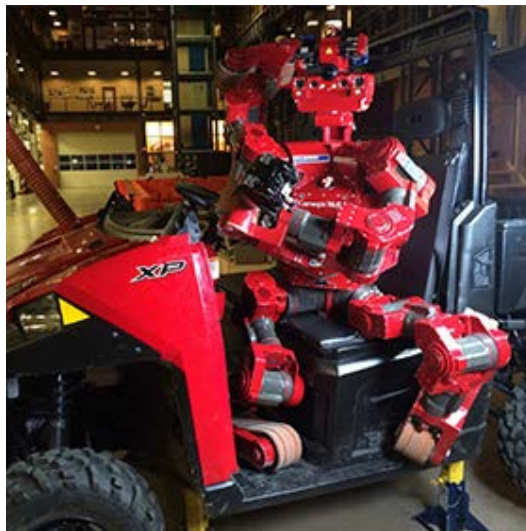


Carnegie Mellon University

The Robotics Institute

2017-2018 Graduate Handbook
Master of Science in Robotics (MSR)



last revised August 11, 2017

Note: The information contained in this graduate handbook focuses on the resources and locations available at the Carnegie Mellon Pittsburgh Campus.

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Welcome

We are proud of the open, friendly culture that has been the hallmark of the Robotics Institute since its inception. Faculty keep their office doors open to encourage informal meetings with students and colleagues. Graduate students organize frequent department-wide social activities, ranging from Friday afternoon get-togethers to rock climbing trips. And the department's strong support for collaboration creates an ideal environment for world class robotics research.

The Robotics Institute is an intellectually diverse, multi-disciplinary department. The Institute's faculty and students come from a wide variety of backgrounds and represent many unique areas of expertise. This diversity stems from the multi-disciplinary nature of the robotics, which encompasses aspects of computer science, mechanical engineering, electrical engineering, psychology, and many other disciplines.

The robotics Master of Science program brings together areas of robotics research that would otherwise be spread across different departments or separate universities, preparing students to take a leading role in the research and development of future generations of integrated robotics technologies and systems.

Since the start of the Robotics PhD program, we have steadily grown and expanded our programs of study. Today, we offer diverse opportunities at all levels of education - from masters programs and an undergraduate minor for Carnegie Mellon students down to the K-12 level, where our renowned programs, workshops, and summer classes inspire and educate the next generation of roboticists.

While this handbook is specific to your academic experience in the department, there are several other resources and offices graduate students are encouraged to consult during their tenure at Carnegie Mellon University. Information about The Word, the student handbook, the Office of the Assistant Vice Provost for Graduate Education, the Office of the Dean of Student Affairs and others are included in Appendix A of this handbook.

Mission or Philosophy/Brief Overview of Department

Even when robotics technologies were relatively primitive, their potential role in boosting the productivity and competitiveness of the United States was foreseen in the evolving global marketplace. The Robotics Institute at Carnegie Mellon University was established in 1979 to conduct basic and applied research in robotics technologies relevant to industrial and societal tasks. Seeking to combine the practical and the theoretical, the Robotics Institute has diversified its efforts and approaches to robotics science while retaining its original goal of realizing the potential of the robotics field.



Degrees Offered

Information about the RI Academic programs can be found [here](#).

PhD Programs

Doctor of Philosophy (PhD) The world's first doctoral program in robotics prepares graduate students to be tomorrow's leaders in robotics research.

Students admitted to the Ph.D. Program in Robotics may choose to further specialize in one of two tracks; M.D. / Ph.D. Program with the University of Pittsburgh Medical Center; Center for the Neural Basis of cognition (CNBC). These students must also be separately admitted to those programs; they fulfill the same basic requirements as regular Ph.D. students in Robotics but have additional requirements to fulfill. Brochures and catalogs for both specialized programs are available as separate documents from the Graduate Program Coordinator.

- *Center for the Neural Basis of Cognition Option*- The Center for the Neural Basis of Cognition offers an interdisciplinary training program operated jointly with affiliated doctoral programs at Carnegie Mellon University and the University of Pittsburgh. The affiliated programs include Robotics, Computer Science, Psychology, and Statistics at Carnegie Mellon, and Mathematics, Psychology, and the Program in Neuroscience at the University of Pittsburgh.
The CNBC option for Robotics Ph.D. students allows them to combine intensive training in RI with a broad exposure to cognitive science, neural computation, and other disciplines that touch on problems of higher brain function.
- *MD / PhD Option*- Students are first accepted into the M.D. / Ph.D. Program at the University of Pittsburgh Medical Center (UPMC), a major medical research institution located within walking distance of the Robotics Institute. After two years of medical school, students enter the Ph.D. portion of their program, which typically lasts from 3 - 5 years, before returning to finish medical school. At the Robotics Institute, a number of faculty are involved in medically related research and may serve as the primary Ph.D. advisor. During their first two years of medical school, students normally work for a 10-week period in one or more laboratories, to determine their choice of Ph.D. advisor. Students apply for admissions to the Robotics Institute during the fall term of their second year in medical school.

Masters Programs

- *Master of Science Research (MSR)* A two year master's program that teaches the fundamentals of robotics theory and practice through coursework and independent research.
- *Master of Science - Robotic Systems Development (MRSD)* A three-semester advanced graduate degree with a combined technical/business focus for recent- graduates/practicing-professionals engaged in, or wishing to enter, the robotics and automation field as practitioners in the commercial sector.
- *Master of Science – Computer Vision (MSCV)* A 16 month master's program that teaches the fundamentals of computer vision theory to prepare students for careers in industry.

Undergraduate Programs

- *Robotics Additional Major*- An in-depth understanding of Robotics Engineering and Science for undergraduates.
- *Robotics Minor*- An undergraduate program that teaches the principles and practice of robotics through theoretical studies and hands-on experience with robotics.

Graduate Student Handbook

This handbook outlines the academic and departmental policies and procedures the MSR program. Students are encouraged to consult the handbook for guidance about degree attainment and other related topics. In addition to the handbook, students should familiarize themselves with the [Roboguide](#). (Must be accessed within network.)

University Policies & Expectations

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](http://www.cmu.edu/student-affairs/theword//index.html) www.cmu.edu/student-affairs/theword//index.html
- [Academic Integrity Website](http://www.cmu.edu/academic-integrity) www.cmu.edu/academic-integrity
- [University Policies Website](http://www.cmu.edu/policies/) www.cmu.edu/policies/
- [Graduate Education Website](http://www.cmu.edu/graduate/policies/index.html) www.cmu.edu/graduate/policies/index.html

Should you need any of the above resources in a different format, you may contact Barbara Jean (B.J.) Fecich. Please see Appendix A for additional information about The Word and University resources.

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: <http://www.cmu.edu/policies/documents/SoA.html>.

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](http://www.cmu.edu/student-affairs/theword/code.html): <http://www.cmu.edu/student-affairs/theword/code.html>

1. Directory

A. Faculty Contacts

Program Director, MSR, RI	George Kantor	MSR Advisor (signatures), program questions
Director of Education, RI	David Wettergreen	
Director, RI	Martial Hebert	Director level signatures
Associate Dean for SCS -MS Programs	Garth Gibson	Associate Dean level signatures
Dean, SCS	Andrew W. Moore	

B. Administrative Contacts

Academic Program Manager, MSR	Barbara Jean (BJ) Fecich	MSR, Undergraduates
Senior Administrative Coordinator	Dan Getkin	Funding coordinator
Academic Program Manager	Suzanne Lyons Muth	PhD

C. Additional RI Resources and Contacts

Robotics Institute Main Office	Alan Guisewite	Room reservations, TR number requests, mail pick-up Newell Simon Hall 4000B 412.268.3818
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[SCS Computing Facilities](#)

Printer issues and set-up

D. University Contacts

[Office of the Assistant Vice Provost for Graduate Education \(AVPGE\)](#)

General Graduate Student Support/ Advocacy

[Division of Student Affairs](#)

General Graduate Student Support/ Advocacy,
Emergency Intervention

[Office of International Education \(OIE\)](#)

International Graduate Issues, Graduate Tax Workshop
for International Students, Immigration Issues

[Intercultural Communication Center \(ICC\)](#)

International TA Screening and Support, Language Skills
Assessment and Placement, Cross-Cultural Adjustment,
Academic Fluency

[Graduate Student Assembly \(GSA\)](#)

Graduate Student Governance

[Enrollment Services - The HUB](#)

Enrollment, Financial Assistance, Academic Calendars,
Transcripts

[Career and Professional Development Center](#)

Career Resources

[Health Services](#)

Health-Wellness Issues

[Counseling and Psychological Services \(CAPS\)](#)

Health-Wellness Issues

[University Police](#)

Transportation - Shuttle/ Escort

Graduate Student Department/College Ombudsman

David Wettergreen and George Kantor serve as ombudspersons for graduate students to assist with difficult academic or personal situations where a confidential sounding board and/or an intermediary can be helpful. Examples of situations where students are encouraged to seek advice or assistance include:

- Difficulty in communications with advisor, particularly when those difficulties may lead to considering changing advisors or leaving the program
- Conflict with other group members that is difficult to resolve within the group
- Issues related to diversity or the departmental climate for those in groups who are historically underrepresented in science
- Personal concerns that interfere significantly with the ability to make timely progress in research or program requirements. These might be due to health, family or financial challenges.
- Additionally, students may confer with the university graduate student ombudsman, Suzie Laurich-McIntyre, slaurichmcintyre@cmu.edu, on issues of process or other concerns as they navigate conflicts. Suzie Laurich-McIntyre is the Assistant Vice Provost for Graduate Education.

Department Information

- [RoboGuide](http://roboguide.ri.cmu.edu/): <http://roboguide.ri.cmu.edu/>
- [Department Directory](http://ri.cmu.edu/people/) : <http://ri.cmu.edu/people/>
- Mail – the correct mailing address to use is:

First and last name
The Robotics Institute, c/o MSR Program
4000B Newell Simon Hall
Carnegie Mellon University
5000 Forbes Avenue
Pittsburgh, PA 15213
- Graduate student travel must be approved in advance by the student's advisor. For travel to a conference, approval must be obtained before the paper is submitted to the conference; for other travel, approval must be obtained before the student can make a commitment to attend. Additional details on travel can be found on the [Business Travel](#) section of the RoboGuide. It is generally expected that the student's advisor, or other faculty member overseeing the travel, will arrange for funding before granting approval for the travel. Funding must be arranged before the travel request can be approved. If there are visa concerns for graduate student travel, check the U.S. State Department's Travel & Living Abroad page.
- [Copy, Printing, Faxing Scanning](#)
- [Conference & Classrooms](#)
- [Robotics Institute Kitchens](#)

Department Approach to Press and Media Relations

To assure consistency in all communications and to maximize external visibility to target audiences the marketing and communication staff works together to coordinate key messages and activities involving publicity.

The director of media relations in the SCS Dean's Office, Byron Spice, is the point-of- contact between news media and the School of Computer Science community, including faculty, students, administrators and staff. He can assist with strategic planning for publicity, interview preparation, and (depending on the specific project or issue) may assist in developing news stories or multi-media for the SCS website and social media channels.

Degree Attainment

A. Statute of Limitations

As outlined in the Master's Students Statute of Limitations, <http://www.cmu.edu/policies/documents/MastersStudentStatuteLimitations.html>, students who have matriculated at Carnegie Mellon beginning Fall 2012 will complete all requirements for the master's degree within a maximum of seven years from original matriculation as a master's student, or less if required by a more restrictive department, school or college policy. Once this time-to-degree limit has lapsed, the person 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 extraordinary circumstances, such as leave of absence, military or public service, family or parental leave, or temporary disability, a school or college 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 a 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.

B. Full-time Status

Full-time status for all students in the Robotics Research Master's Program is a minimum of 36 units each semester.

C. Master of Science Program Curriculum and Related Policies/Protocols

The degree requirements for students in the Robotics Research Master's Program (MSR) at Carnegie Mellon consist of core course requirements, elective courses, and supervised research culminating in a public thesis talk and a Master's Thesis document.

The Robotics Research Master's Degree (MSR) Program is a doorway to a research career, preparing the candidate well for doctoral degree programs as well as research staff positions at companies and government agencies such as NASA, Mitsubishi and Google. The degree emphasizes course and research qualifications equally, ensuring that the student attains both breadth of understanding in Robotics together with specialized depth knowledge in an area of particular interest to the student and faculty advisor. Depth areas are entirely customized to student and faculty joint interests, including for instance Human-Robot Interaction, Haptics, Field Robotics, Robotic Vision, Machine Learning, et cetera.

The MSR program is designed to be completed nominally in two full years as outlined below, with exceptional trajectories as described below for the fifth-year Research Master's option available to admitted Carnegie Mellon undergraduates, and for Carnegie Mellon staff who are taking courses and conducting research part-time while performing staff duties. Cohorts start in the fall semester and graduate in August (summer) of their second year.

The MSR program does not provide or guarantee funding; students are expected to secure two years' of funds to pay for their educational costs. It is Robotics Institute policy that incoming students may not receive funding (via a research assistantship or otherwise) their first semester unless the funding is outlined in their offer letter. Offer letters may be updated until April 1st. Fifth Year students can begin the summer after bachelor degree completion and count that as their first semester in the program if enrolled in 36 units of on-campus research with approval of their research advisor.

The Master's Thesis requirement is satisfied through the oversight of the Master's Committee, formed from faculty and students at The Robotics Institute who read and approve the Master's Thesis document and attend and approve the public thesis presentation, as described below.

Review of Progress

Satisfactory progress in coursework will be assessed by the student keeping up with the course schedule and passing courses. All courses must be passed with a grade of B-, or better. An overall grade point average of a 3.3 or higher is required to graduate.

Elective coursework must be approved by the Master's program head during the first month of classes in the first semester, and prior to class enrollment in all subsequent semesters. The faculty research advisor will assign a pass / fail grade every semester for the supervised research. To oversee completion of the Master's thesis requirements the student will form a Master's Committee that will verify the quality of the Master's thesis in both written and presentation forms.

Faculty Advisor

MSR students beginning in the fall semester must have a faculty advisor by October 31st; those beginning in the spring semester must have a faculty advisor by April 15th. Students must notify the Master's program head of their mutually agreed-upon advisor-advisee relationship with a chosen faculty member. Note that the faculty must have a faculty appointment in the Robotics Institute, and that a faculty accepting the Master's advisor relationship is never financially responsible for the Master's student, except in the relatively rare cases when a research assistantship has been explicitly negotiated.

Master's Committee

The Master's Committee must be formed by the end of the student's second semester. The student will form a Master's Committee by the end of their second semester; consisting of their research advisor(s), an additional RI faculty member and an RI PhD student. If the student is co-advised both research advisors must be on the committee in addition to another faculty member. The additional faculty member should be from a different research group or project than that of the student. The PhD student must have completed his or her second year of study, or has successfully graduated from the Robotics Research Master's program. The student is expected to hold at least two research meetings with each member of the committee individually, discussing his or her research directions.

On-line forms are used (Speaking and Writing Qualifier forms, via the BlackFriday site) by the committee members to report on and to approve the final thesis document and presentation. Committee approvals must be submitted by the grade deadline in the semester which the student wishes to graduate.

D. Course of Study

The Research Master's Degree requires completion of a minimum of 168 Carnegie Mellon units. Of the total units fulfilling the Master's Degree requirements, at least 84 units must be comprised of core and elective coursework, and at least 84 units must be comprised of supervised research. Four core courses and three elective courses are required as part of the 84 credit course minimum as described below:

Core Courses

Four of the courses must be drawn from the "Core Courses", one course from each of the following four areas. Note that this list of core course options is identical to the Core Course list required for the Robotics Ph.D. program at The Robotics Institute. If admitted in to the RI PhD program the core courses taken during the MSR program can be used towards the core requirements of the Ph.D. program.

- Perception: vision, image sensors, range data interpretation, tactile and force sensors, inertial guidance, and other sensors. Core courses in Perception are 16-720 Computer Vision, and 16-722 Sensing and Sensors.
- Cognition: artificial intelligence for robotics, including knowledge representation, planning, and task scheduling. Core courses in Cognition are 15-780 Graduate Artificial Intelligence, and 10-601/10-701 Machine Learning (MS/PhD Levels).
- Action: kinematics, dynamics, control, manipulation and locomotion. Core courses in Action are 16-741 Mechanics of Manipulation, and 16-711 Kinematics, Dynamic Systems and Control.
- Math Foundations: signal processing, optimal estimation, differential geometry, and operations research. There is one core course in this area: 16-811 Math Fundamentals for Robotics.

Elective Courses

The student must take at least 36 units of elective courses, comprising at least 3 elective courses. These can be drawn from appropriate graduate courses in Robotics and in related disciplines at Carnegie Mellon. All Robotics Institute graduate level courses (16-600 or higher) are approved electives. Elective coursework outside of the Robotics Institute must be approved by the Master's program chair during the first month of classes in the first semester, and prior to class enrollment in all subsequent semesters. Request approval by e-mailing the program chair and cc'ing B.J. Fecich.

Supervised Research

The remaining units, a minimum of 84 units, come from supervised research (16-997). Supervised research is conducted with a faculty research advisor. It consists of working on one of their on-going projects to develop a research thesis question, conduct the research and create the material results that can give form to the Master's Thesis. Supervised research is graded pass/fail, based on the advisor's assessment that the student has learned how to contribute to an original research project. Those students who receive research assistantships (in the form of tuition or stipend) are expected to satisfy their supervised research requirement by registering for a minimum of 24 research units and working specifically on the project from which they receive their funding. A faculty advisor may require a student to remain on campus and continue full-time research during both summer sessions.

Resources and Regulations Governing Research at Carnegie Mellon

- Office of Sponsored Programs
- Office of Research Integrity & Compliance
- Intellectual Property Policy
- Policy on Restricted Research
- Human Subjects in Research Policy

Final Presentation and Thesis Document

The student is expected to give an oral thesis presentation in a public venue at Carnegie Mellon. The student is expected to demonstrate the ability to present technical material to a technical audience that is not presumed to have specific expertise in the research area. The Master's Committee should be in attendance, but committee members may designate proxies to evaluate the presentation and fill out the Oral qualifying form.

The student is also expected to deliver a Master's Thesis describing the supervised research. This should be a document for which the student is the sole or principal author. The thesis should demonstrate a style, organization and clarity that enable researchers in the field to comprehend the problem, method, and results of the research. The Thesis should, at a minimum, contain the following sections and ingredients: Background, Research Question, Related Work, Methods, Results, and Conclusions. There is not a specific page-based minimum length for the Thesis document. Once approved, the Thesis must be archived as a Carnegie Mellon Technical Report. The principal approval for the Thesis document is provided by the student's committee, via the Writing Qualifier form.

In both the presentation and document, the student should convey a mastery of a topic related to contemporary robotics research. The student should present a summary of work related to the topic from the current research literature, and should clearly describe how his/her research fits into the context of that research. It is not necessary for the student to generate his/her own novel research results that go beyond the current state of art, but of course novel results are welcome and will strengthen the presentation and document.

The student is also expected to deliver a complete thesis draft document to their committee sufficiently in advance (recommendation of two weeks) of the oral presentation to enable committee feedback. The oral thesis presentation must occur on a weekday on or before the last day of classes in the semester the student intends to graduate. All thesis requirements, including upload and qualifier forms, must be received by the date and time that grades are due for certification in that semester.

Carnegie Mellon Staff Enrollees

Carnegie Mellon staff can enroll in university courses at reduced or zero tuition cost. Staff can utilize this approach to satisfy the core courses for the MSR program; however, staff should formally apply as soon as possible.

Following acceptance, staff should form their thesis committee and mutually select a faculty advisor. Staff are now eligible to take elective courses and must be enrolled in the MSR program for a minimum of two academic (fall and spring) semesters prior to graduation.

Staff members interested in utilizing the tuition benefits must coordinate directly with Human Resources. If the staff member is here on a Visa, it is the staff member's responsibility to ensure they have appropriate status with the Office of International Education to pursue an academic degree.

Undergraduate "Fifth-Year" Enrollees

Carnegie Mellon undergraduates can minimize the two year program commitment by applying as a "5th Year" student the fall of their senior year. If admitted 5th year students may take a maximum of the four core courses while still an undergraduate student. Elective courses and supervised research may only be taken upon completion of a bachelor's degree, while enrolled as a graduate student.

To finish the program in a "5th year" students: complete all core courses as an undergraduate, enroll in full-time supervised research the subsequent summer after graduation, register for supervised research and elective courses during the fall and spring semesters and complete their research and thesis requirements in the summer. This is the earliest possible completion for the program but students are also able to utilize the entire two years if they prefer.

Note that courses cannot count toward multiple degrees, therefore core courses taken as an undergraduate can only be applied toward the MSR degree if they are not used to satisfy any undergraduate degree requirements.

Following acceptance, students wishing to complete the program early should form their Master's Committee and mutually select a faculty advisor. This is particularly important for senior undergraduates wishing to begin their research units in the summer, as research units will not count toward the MSR degree unless the student has an approved committee and research advisor.

The Robotics Institute (RI) Orientation Week

The student's research education begins during the Robotics Institute's Orientation, which incoming students must attend at the beginning of their first semester in the program. RI Orientation is a series of lectures, discussions, and activities that familiarize students with Carnegie Mellon, the Robotics Institute, and the MSR program. Orientation week introduces students to the faculty and research labs within the Institute and affiliated departments, providing an opportunity for students to learn what it means to conduct graduate level research and identifying potential faculty advisor matching opportunities.

Prerequisites to the Core Courses

It is each student's personal responsibility to arrive with, or to acquire rapidly thereafter, basic understanding (at the level of an introductory undergraduate course) in the following areas:

- Mathematics: calculus, linear algebra, numerical analysis, probability and statistics
- Computer Science: programming, data structures, algorithms
- Physics and Engineering: mechanics, dynamics, electricity and magnetism, optics

On request, the faculty will advise incoming students about individually appropriate alternative ways to satisfy these requirements, e.g., taking an undergraduate course, serving as a TA in an undergraduate course, or self-study by guided reading and discussion.

Transfer Credit / Course Waiver & PCHE

Transfer courses are not accepted for the MSR program. However, if a student has completed course work related to the required core courses, they may request a core course waiver. A core course waiver is requested via email by the student directly to the faculty member teaching the core course. The teaching faculty member will identify if the student has mastered the course content and provides their waiver recommendation via email to the Program Chair and Program Manager. The Program Chair makes the final decision. If a student disagrees with the waiver request outcome, he or she may petition the Program Chair to assign a suitable faculty member, aside from the teaching faculty member, to review the request, typically the relevant course instructor or an expert in the topic.

A core course waiver permits the student to take an additional 12 unit elective course instead of a course in the core area. The waiver does not provide units for the course and does not appear on a student's transcript.

www.cmu.edu/policies/documents/TransferCredit.html

Carnegie Mellon University offers students the opportunity to take courses for credit through a cross-registration program (see Pittsburgh Council on Higher Education (PCHE) and Cross-registration below) and through the receipt of transfer credit from other accredited institutions. The Carnegie Mellon University transcript will include information on such courses as follows: Carnegie Mellon courses and courses taken through the university's cross-registration program will have grades recorded on the transcript and be factored into the QPA. All other courses will be recorded on this transcript indicating where the course was taken, but without grade. Such courses will not be taken into account for academic actions, honors or QPA calculations. (Note: suspended students may take courses elsewhere; however, they may receive transfer credit only if their college and department's policies allow this.)

Independent Study

Independent Study (16-995) is a course designed to provide students with an opportunity for intensive study of a subject that is either unavailable or insufficiently covered in regular course work. Independent study is not intended to substitute for existing courses, but to provide the opportunity for a specialized educational and research experience.

Any faculty member in the Robotics Institute is eligible to serve as the supervisor of an Independent Study research project. The student must provide a brief prospectus of the project to the faculty supervisor as a basis for reaching agreement on the objectives of the study and provide this to their research advisor and the Program Chair for approval.

Internship

Practicum (16-990) is a course designed to provide students with an opportunity for internship experience to count towards the required 84 units of research. MSR students have the option to register for a maximum of 24 units in the summer after their first academic year. Students are not eligible for summer internship credit in their first or last semester. International students must consult with the Office of International Education for eligibility prior to seeking an internship or signing an offer contract.

Students interested in doing a summer internship must first have their research advisor's support. Some research projects require students to be on-campus performing research for both summer sessions. Students must also have their research advisor's approval that the content of the internship corresponds to or assists with the student's on-campus research project. By providing their approval the research advisor is committing to over-see the content of the internship, which culminates in a one-page report due to the Program Manager the day before summer grades are due.

Grades and Grading

A letter grade of a B- or better is required for all MSR core and elective coursework. Once the required coursework is completed, students register for a blanket course (e.g., 16-997- "Reading and Research") covering all their program activities for that semester, for which they receive a Pass/No Pass grade.

The University Policy on Grades www.cmu.edu/policies/documents/Grades.html offers details concerning university grading principles for students taking courses and covers the specifics of assigning and changing grades, grading options, drop/withdrawals and course repeats. It also defines the undergraduate and graduate grading standards.

Summary of Graduate Student Appeal and Grievance Procedures

<http://www.cmu.edu/graduate/policies/Summary%20of%20Graduate%20Student%20Appeal%20and%20Grievance%20Procedures.html>

Graduate students will find the Summary of Graduate Student Appeal and Grievance Procedures on the Graduate Education Resource webpage. This document summarizes processes available to graduate students who seek review of academic and non-academic issues. Generally, graduate students are expected to seek informal resolution of all concerns within the applicable department, unit or program before invoking formal processes. When an informal resolution cannot be reached, however, a graduate student who seeks further review of the matter is to follow the formal procedures outlined here. These appeal and grievance procedures shall apply to students in all graduate programs of the University. Students should refer to the department specific information in this handbook for department and college information about the administration and academic policies of the program. Additionally, students may confer with the graduate student ombudsman, Suzie Laurich-McIntyre, slaurichmcintyre@cmu.edu, on issues of process or other concerns as they navigate conflicts

Academic Integrity

Please review the University expectations at: <http://www.cmu.edu/academic-integrity/>

Please review the entire policy at: <http://www.cmu.edu/policies/documents/Academic%20Integrity.htm>

University-wide Protocol: <http://www.cmu.edu/academic-integrity/documents/academic-disciplinary-actions-overview-for-graduate-students.2013.pdf>

Leave of Absence

Students who wish to leave the program temporarily may request a leave of absence by submitting a request to the Program Manager. 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. Students not in good standing will have conditions for return determined by the Program Chair in consultation with the advisor.

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

Enrollment Verification

Enrollment Services is the only University office that can provide an official letter of enrollment, official transcript and enrollment verification. Enrollment verification can be requested online through The HUB at: <http://www.cmu.edu/hub/transcripts/verifications/enrollment.html>.

University Financial Aid

Students should consult the graduate student financial aid information found on The HUB website: <http://www.cmu.edu/finaid/basics/graduate>. There students will find the Graduate Financial Aid Guide, information about funding options, how to apply for financial aid and other helpful links.

Graduate students who find themselves in need of immediate funds for emergency situations should contact the Office of the Dean of Student Affairs (see Appendix A), www.cmu.edu/student-affairs/index.html, to inquire about an Emergency Student Loan.

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: 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 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.

Appendix A

Highlighted University Resources for Graduate Students and The WORD, Student Handbook

Key Offices for Graduate Student Support

A. Office of the Assistant Vice Provost for Graduate Education - www.cmu.edu/graduate

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 partners 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 can be found 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, particularly graduate students of color and women in the science and technical fields. 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
- Graduate Women Gatherings (GWG)
- Inter-university Graduate Students of Color Series (SOC)

B. Office of the Dean of Student Affairs - www.cmu.edu/student-affairs/index.html

The Office of the Dean provides central leadership of the metacurricular 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 | - Office of Community Standards and Integrity |
| - Cohon University Center | - Office of Student Leadership, Involvement, and Civic Engagement |
| - Counseling & Psychological Services (CaPS) | - University Health Services |
| - Dining Services | - Wellness Initiatives |
| - Housing Services | |

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 made

available through the 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: www.cmu.edu/academic-integrity.

C. 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 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/education-office/disability-resources/>. Students with disabilities are encouraged to self-identify with Equal Opportunity Services by contacting Catherine Getchel, 412-268-6121, getchell@cmu.edu to access the services available at the university and initiate a request for accommodations.

D. Eberly Center for Teaching Excellence & Educational Innovation - 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: www.cmu.edu/teaching/graduatestudentsupport/index.html.

E. Carnegie Mellon 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 www.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.

F. Graduate Student Assembly - 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/index.html>.

Each department has representation on GSA and receives funding directly from GSA's 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.

G. Intercultural Communication Center (ICC) - 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 international 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.

H. 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.

I. 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, veteran's 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.

Key Offices for Academic & Research Support

A. Computing and Information Resources - 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: www.cmu.edu/computing/guideline/index.html.

B. Research at CMU - www.cmu.edu/research/index.shtml

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.

C. Office of Research Integrity & Compliance - 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.

Key Offices for Health, Wellness & Safety

A. Counseling & Psychological Services - 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. CAPS services are provided at no cost. Appointments can be made in person or by telephone, 412-268-2922.

B. Health Services - 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. 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.

C. Campus Wellness - <http://www.cmu.edu/student-affairs/wellness/>

At the university, we believe our individual and collective well-being is rooted in healthy connections to each other and to campus resources. There are a wide variety of resources, opportunities and people that 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.

D. University Police - <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, 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.

E. Shuttle and Escort Services

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/>

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 www.cmu.edu/police/annualreports.

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, opportunities, academic policy information, resources, community standards information, and resources. It is designed to provide all students with the tools, guidance, and insights to help you achieve your full potential as a member of the Carnegie Mellon community. Information about the following is included in The WORD (not an exhaustive list) and graduate students are encouraged to bookmark this site and refer to it often.

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

Carnegie Mellon Vision, Mission

Carnegie Code

Academic Standards, Policies and Procedures

- Educational Goals

- Academic and Individual Freedom

- Statement on Academic Integrity

- Standards for Academic & Creative Life

Assistance for Individuals with Disabilities

Master's Student Statute of Limitations

Conduct of Classes

Copyright Policy

Cross-college & University Registration

Doctoral Student Status Policy

Evaluation & Certification of English Fluency for Instructors

Final Exams for Graduate Courses

Grading Policies

Intellectual Property Policy

Privacy Rights of Students

- Research

- Human Subjects in Research

Office of Research Integrity & Compliance

Office of Sponsored Programs

Policy for Handling Alleged Misconduct of Research

Policy on Restricted Research

Student's Rights

Tax Status of Graduate Student Awards

Campus Resources & Opportunities

Alumni Relations

Assistance for Individuals with Disabilities

Athletics, Physical Fitness & Recreation

Carnegie Mellon ID Cards and Services

Cohon University Center

Copying, Printing & Mailing

Division of Student Affairs

Domestic Partner Registration

Emergency Student Loan Program

Gender Programs & Resources

Health Services

Dining Services

The HUB Student Services Center

ID Card Services

Leonard Gelfand Center

LGBTQ Resources

Multicultural and Diversity Initiatives

Opportunities for Involvement

Parking and Transportation Services

SafeWalk

Survivor Support Network

Shuttle and Escort Services

Spiritual Development

University Police

Student Activities

University Stores

Community Standards, Policies and Procedures

Alcohol and Drugs Policy

AIDS Policy

Bicycle/Wheeled Transportation Policy

Damage to Carnegie Mellon Property

Deadly Weapons

Discriminatory Harassment

Disorderly Conduct

Equal Opportunity/Affirmative Action Policy

Freedom of Expression Policy

Health Insurance Policy

Immunization Policy

Missing Student Protocol

Non-Discrimination Policy

On-Campus Emergencies

Pets

Political Activities

Recycling Policy

Riotous and Disorderly Behavior

Safety Hazards

Scheduling and Use of University Facilities

Sexual Harassment and Sexual Assault Policy

Smoking Policy

Student Accounts Receivable and Collection Policy and Procedures

Student Activities Fee

Student Enterprises

Workplace Threats and Violence Policy

Statement of Assurance

Last updated: June 16, 2017