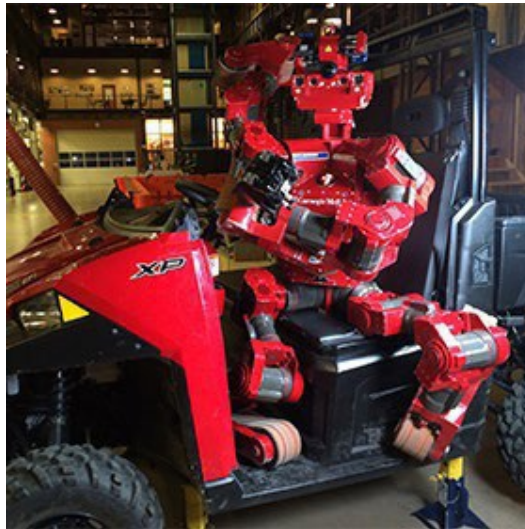


Carnegie Mellon University

The Robotics Institute

2022-2023 Graduate Handbook
Master of Science in Robotics (MSR)



last revised August 25, 2022

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

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2 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 master's 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 Graduate and Postdoc Affairs, the Office of the Dean of Student Affairs and others are included in Appendix A of this handbook.

3 CARNEGIE MELLON UNIVERSITY – MISSION AND VISION

Vision

Carnegie Mellon University will have a transformative impact on society through continual innovation in education, research, creativity, and entrepreneurship. (<https://www.cmu.edu/about/mission.html>)

Mission

To create a transformative educational experience for students focused on deep disciplinary knowledge; problem solving; leadership, communication, and interpersonal skills; and personal health and well-being. To cultivate a transformative university community committed to (a) attracting and retaining diverse, world-class talent; (b) creating a collaborative environment open to the free exchange of ideas, where research, creativity, innovation, and entrepreneurship can flourish; and (c) ensuring individuals can achieve their full potential. To impact society in a transformative way – regionally, nationally, and globally – by engaging with partners outside the traditional borders of the university campus. (<https://www.cmu.edu/about/mission.html>)

4 CARNEGIE MELLON UNIVERSITY STATEMENT OF ASSURANCE

Carnegie Mellon University does not discriminate in admission, employment or administration of its programs or activities based on 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 university ombudsperson. Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, telephone 412-268-1018. Obtain general information about Carnegie Mellon University by calling 412-268-2000.

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. You can obtain a copy by contacting the Carnegie Mellon Police Department at 412-268-2323. The annual security and fire safety report is available online www.cmu.edu/police/annualreports.

Information regarding the application of Title IX, including to admission and employment decisions, the sexual misconduct grievance procedures and process, including how to file a report or a complaint of sex discrimination, how to file a report of sexual harassment, and how the university responds to such reports is available at www.cmu.edu/title-ix. The Title IX coordinator may be reached at 412-268-7125 or tix@cmu.edu.

5 THE CARNEGIE MELLON CODE

Students at Carnegie Mellon, because they are members of an academic community dedicated to the achievement of excellence, are expected to meet the highest standards of personal, ethical, and moral conduct possible. These standards require personal integrity, a commitment to honesty without compromise, as well as truth without equivocation and a willingness to place the good of the community above the good of the self.

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

The discovery, advancement and communication of knowledge are not possible without a commitment to these standards. Creativity cannot exist without acknowledgment of the creativity of others. New knowledge cannot be developed without credit for prior knowledge. Without the ability to trust that these principles will be observed, an academic community cannot exist. The commitment of its faculty, staff and students to these standards contributes to the high respect in which the Carnegie Mellon degree is held. Students must not destroy that respect by their failure to meet these standards. Students who cannot meet them should voluntarily withdraw from the university. The code can also be found on-line: <https://www.cmu.edu/student-affairs/theword/>.

6 ROBOTICS INSTITUTE PHILOSOPHY

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.

7 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 www.cmu.edu/student-affairs/theword//index.html

Academic Integrity Website www.cmu.edu/policies/student-and-student-life/academic-integrity.html

University Policies Website www.cmu.edu/policies/

Office of Graduate and Postdoc Affairs Website 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.

8 SAFEGUARDING EDUCATIONAL EQUITY / SEXUAL MISCONDUCT POLICY:

The University prohibits sex-based discrimination, sexual harassment, sexual assault, dating/ domestic violence and stalking. The University also prohibits retaliation against individuals who bring forward such concerns or allegations in good faith. The University's Sexual Misconduct Policy is available at <https://www.cmu.edu/policies/administrative-and-governance/sexual-misconduct/index.html>. The University's Policy Against Retaliation is available at <https://www.cmu.edu/policies/administrative-and-governance/whistleblower.html>. If you have been impacted by any of these issues, you are encouraged to make contact with any of the following resources:

- Office of Title IX Initiatives, <https://www.cmu.edu/title-ix/> 412-268-7125, tix@cmu.edu
- University Police, 412-268-2323

Additional resources and information can be found at: <https://www.cmu.edu/title-ix/resources-and-information/resources.html>.

9 GRADUATE STUDENT DEPARTMENT/COLLEGE OMBUDSPERSON

George Kantor, David Wettergreen, and Dimi Apostolopoulos 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.

10 ROBOTICS INSTITUTE DEGREES OFFERED

PhD Program

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

Masters Programs

- Master of Science Research (MSR) A two-year (24 month) master's program that teaches the fundamentals of robotics theory and practice through coursework and independent research.
- Master of Science - Robotic Systems Development (MRSD) An 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.

11 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.

12 ACADEMIC CALENDAR

The Academic Calendar can be found at <https://www.cmu.edu/hub/calendar/index.html> and provides information on all deadlines including registration dates, class start dates, add/drop deadlines, exam dates and more.

13 DIRECTORY – DEPARTMENTAL PERSONNEL

13.1 DEPARTMENT LEADERSHIP

MSR Program Director, RI	Dimitrios (Dimi) Apostolopoulos	MSR advisor signatures
Associate Director of Education, RI	George Kantor	
Director, RI	Matthew Johnson-Roberson	Director level signatures
Associate Dean of MS Programs, SCS	David Garlan	Dean level signature
Dean, SCS	Martial Hebert	

13.2 ADMINISTRATIVE CONTACTS

Manager, RI Academic Programs	Barbara (B.J.) Fecich	Manages RI Education Team / MSR program
Senior Administrative Coordinator	Tracy Linza	Funding coordinator
Academic Program Manager	Suzanne Lyons Muth	PhD program
Academic Program Manager	Sarah Conte	MRSD and MSCV programs
Academic Program Manager	Samantha (Sam) Bridge	Undergraduate programs
Robotics Institute Main Office	Alan Guisewite	TR number requests, mail
	SCS Computing Facilities	Printer issues and set-up
	SCS Building Facilities	Building, key related issues

13.3 UNIVERSITY CONTACTS

[Graduate Education Office](#) - Graduate student support/ advocacy

[Student Academic Success Center](#) - Graduate student academic support, workshops, and events

[Division of Student Affairs](#) - Graduate student support/ advocacy, emergency intervention

[Office of International Education \(OIE\)](#) - International graduate issues, generic tax workshop for international students, immigration compliance

[Graduate Student Assembly \(GSA\)](#) - Graduate student governance

[Enrollment Services](#) - The HUB - Enrollment, financial assistance, academic calendars, transcripts

[Career and Professional Development Center \(CPDC\)](#) - Interview, employment, career resources and advocacy

[Health Services](#) - Health-wellness issues

[Counseling and Psychological Services \(CAPS\)](#) - Health-wellness issues

[University Police](#) - Transportation - Shuttle/ Escort

14 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.

15 DEPARTMENT INFORMATION

- **RoboGuide:** <http://roboguide.ri.cmu.edu/>
- **Department Directory:** <http://ri.cmu.edu/people/>
- **Mail** – Personal mail should not be directed to the Robotics Institute. Mail required for business purposes should be addressed as:
First/Given Name 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.

16 MASTER'S DEGREE COMPLETION AND CERTIFICATION

16.1 STANDARD DEGREE REQUIREMENTS AND DEGREE CERTIFICATION

Carnegie Mellon graduate students are expected to complete their degree requirements within the standard length of time for their program of study as outlined in the relevant Graduate Student Handbook. Standard program lengths for graduate students vary significantly – ranging from two semesters for some full-time master's programs to several or more years for doctoral programs. Upon completion of the graduate program degree requirements, the degree will be certified by the student's academic program in the semester in which the student completes the requirements.

Early Completion

Graduate students who consider the completion of all degree requirements in less than the standard length of time for their program of study may consult with their degree-granting program or department to determine if early degree certification is allowed and under what circumstances.

Extended or Longer-than-Standard Completion

Longer-than-standard degree completion may occur due to academic interruptions in making progress toward the degree as defined by the academic program, interruptions of full-time study or progress towards the degree due to serious, documented medical issues, or other unusual or unforeseen circumstances. Master's students who require longer than the standard time to complete their degree requirements are expected to remain in close contact with their graduate program and will be certified at the end of the semester in which they have completed their degree requirements.

16.2 ADDITIONAL GUIDANCE FOR STUDENTS

Program of study.

Students seeking guidance about their program of study and degree requirements should consult with their academic advisor and/or appropriate associate dean.

Financial aid and student account.

Students are expected to make normal progress toward their degree to graduate within the standard timeframe for their program of study. Under U.S. Federal Title IV regulations, student eligibility for federal financial aid is contingent upon enrollment in and successful completion of courses that are counted as credit toward their current degree program. To receive the maximum amount of federal financial aid for which they may be eligible, students must enroll each semester in at least 36 units that count toward their current degree level. (See separate guidance regarding integrated degree completion.) Students should consult with their designated college liaison in The HUB regarding billing and financial aid, particularly for early completion, longer-than-standard completion, or integrated undergraduate and master's degree programs.

International students.

Immigration status for students in F-1 and J-1 non-immigrant status is tied to making normal progress toward completing degree requirements. Therefore, F-1 and J-1 students who are considering completing their degree requirements early, anticipating longer-than-standard completion, or moving from an undergraduate to a graduate student classification (integrated undergraduate-graduate study) should consult with their designated advisor in the Office of International Education (OIE) to ensure compliance with immigration regulations.

16.3 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.

16.4 FULL-TIME STATUS

Full-time status for all students in the Robotics Research Master's Program is a minimum of 36 units each semester. International students must be in Full-time status for all semesters and need to consult the Office of International Education if they may not be in full time status.

16.5 STATUTE OF LIMITATIONS

As outlined in the Master's Students Statute of Limitations, <https://www.cmu.edu/policies/student-and-student-life/masters-studentsstatute-of-limitations.html> students 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.

17 MASTER OF SCIENCE PROGRAM CURRICULUM

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 those admitted via the Accelerated Graduate Program 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. Accelerated admission students can begin the summer after bachelor's 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.

17.1 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.

17.2 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 their 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 their research directions. On-line forms are used (Speaking and Writing Qualifier forms, via the Gsaudit 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.

17.3 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. The 168 units for the MSR degree may not double count for another undergraduate or master's program. Four core courses and three elective courses are required as part of the 84-credit course minimum as described below:

17.3.1 Supervised Research

A minimum of 84 units of supervised research (16-997) credit is required to graduate. 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: <https://www.cmu.edu/osp/>
- Office of Research Integrity & Compliance: <https://www.cmu.edu/research-compliance/index.html>
- Intellectual Property Policy: <https://www.cmu.edu/policies/administrative-and-governance/intellectual-property.html>
- Policy on Restricted Research: <https://www.cmu.edu/policies/research/restricted-research.html>
- Human Subjects in Research Policy: <https://www.cmu.edu/policies/research/human-subjects-in-research.html>

17.3.2 Core Courses

Four of the courses must be drawn from the "Core Courses", one course from each of the following four areas. If admitted into the RI PhD program the core courses taken during the MSR program can be used towards the core requirements of the Ph.D. program (except for 10-601). These courses are required; **substitutions cannot be made.**

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

17.3.3 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 the MSR program manager.

17.4 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 their research fits into the context of that research. It is not necessary for the student to generate their 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.

18 CARNEGIE MELLON STAFF AND ACCELERATED GRADUATE STUDENTS

18.1 CARNEGIE MELLON STAFF ENROLLEES

Carnegie Mellon staff can enroll in university courses at reduced or zero tuition cost via the tuition remission benefit in Human Resources. 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.

18.2 UNDERGRADUATE ACCELERATED GRADUATE STUDENT ENROLLEES

Carnegie Mellon undergraduates can minimize the two-year program commitment by applying as an accelerated graduate student their senior year. If admitted accelerated graduate 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 students must complete all core courses (as an undergraduate or graduate student), 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 second summer. This is the earliest possible completion for the program. 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.

19 PROGRAM POLICIES

19.1 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.

19.2 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.

19.3 INTERNSHIP

Practicum (16-990) is a course designed to provide students with an opportunity for an 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** have their research advisor's support. The research advisor needs to confirm 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.

19.4 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 project. The student must complete the Independent Study Request form, which includes a brief prospectus of the project to the faculty supervisor as a basis for reaching agreement on the objectives of the study. The Independent Study Request Form will be reviewed by the MSR Program Chair for final approval.

Independent studies may only be requested during the normal course add period for any given semester.

19.5 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.

<https://www.cmu.edu/policies/student-and-student-life/transfer-credit-evaluation-and-assignment.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 considered 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.)

20 UNIVERSITY / DEPARTMENTAL POLICIES

20.1 CHANGE OF ADDRESS

Students are responsible for notifying RI and the HUB of all address changes in a timely manner. Students will be held responsible for any failure to receive official college notices due to not having a correct address on file; F-1 students may jeopardize their status if address information is not kept current.

Students can change their address using SIO, which is available via the HUB website:

<http://www.cmu.edu/hub/index.html> .

20.2 NEW POLICIES / "GRANDFATHER" POLICY

When policies are changed it is because the department believes the new rules offer an improvement; any such changes will be discussed at a meeting with the graduate students. However, students currently enrolled whose degree program is affected by a change in policy may choose to be governed by the older policy that was in place at the time of their matriculation. In case degree requirements are changed and certain courses are no longer offered, the department will try to find some compromise that allows those students to satisfy the original requirements.

20.3 ACADEMIC INTEGRITY

Please review the University Policy on Academic Integrity (<https://www.cmu.edu/policies/student-and-student-life/academic-integrity.html>) The policy includes the University expectations around academic integrity and provides definitions of cheating, plagiarism, and unauthorized assistance.

A review of the University's Academic Disciplinary Actions procedures (<https://www.cmu.edu/student-affairs/theword/academic-discipline/index.html>) is also recommended. These procedures outline the process for investigating, reporting, and adjudicating violations of the University Policy on Academic Integrity. The procedures also outline the appeal process.

20.4 GRADUATE STUDENT TIME OFF POLICY (INCLUDING SUMMER MONTHS)

Students with graduate assistantships are expected to continue with their research during academic breaks (including the summer months) except for the official university holidays. A complete list of the official university holidays can be found at the Human Resources website.

Due to federal regulations governing graduate student support, paid time off for personal business and vacations is not provided. A supported graduate student wanting to take a one-week break during one of the summer months in which they are receiving a stipend is expected to get approval for that break with their advisor and make up the work during the other three weeks of that month. Supported graduate students wishing to take longer periods of personal time off must do so without pay and must receive advanced approval from their research advisor a minimum of four weeks prior to the requested time off. The advisor must then notify the Graduate Program Administrator and Business Manager of this approval so that stipend adjustments can be processed.

University Holidays:

New Year's Day (Jan 1)	Independence Day (July 4)	Memorial Day
Labor Day	Thanksgiving Day	Day after Thanksgiving
Day before Christmas (Dec 24)	Christmas Day (Dec 25)	Day before New Year's Day (Dec 31)

20.5 PROCESS FOR APPEALING FINAL GRADES

<https://www.cmu.edu/student-affairs/theword/academic/appeal-of-grades-and-academic-actions.html>

Final grades will be changed only in exceptional circumstances and only with the approval of the instructor and the department, unit, or program. Grading is a matter of sound discretion of the instructor and final grades are rarely changed without the consent of the instructor who assigned the grade. The following circumstances are the unusual exceptions that may warrant a grade appeal: (a) the final grade assigned for a course is based on manifest error (e.g. a clear error such as arithmetic error in computing a grade or failure to grade one of the answers on an exam), or (b) the faculty or staff member who assigned the grade did so in violation of a University policy.

20.6 TUITION

Current tuition rates and cost of living including books, insurance, activities and technology fees, food and lodging costs can be found at the Enrollment Services website. Research and teaching assistantships are available to qualified, full-time students.

20.7 ASSISTANCE FOR INDIVIDUALS WITH DISABILITIES

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

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

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

20.8 POLICY AGAINST SEXUAL HARASSMENT AND SEXUAL ASSAULT

The University prohibits sex-based discrimination, sexual harassment, sexual assault, dating/ domestic violence, and stalking. The University also prohibits retaliation against individuals who bring forward such concerns or allegations. The policy can be viewed in its entirety at: http://www.cmu.edu/policies/documents/SA_SH.htm.

If you have been impacted by any of these issues, you are encouraged to contact any of the following resources:

- Office of Title IX Initiatives, <http://www.cmu.edu/title-ix/>, 412-268-7125, tix@cmu.edu
- University Police, 412-268-2323
- University Health Services, 412-268-2157
- Counseling & Psychological Services, 412-268-2922

Additional resources and information can be found at: <https://www.cmu.edu/title-ix/resources-and-information/resources.html>.

20.9 CONSENSUAL INTIMATE RELATIONSHIP POLICY REGARDING UNDERGRADUATE STUDENTS

<https://www.cmu.edu/policies/student-and-student-life/consensual-relationships.html>

This policy addresses the circumstances in which romantic, sexual or amorous relationships/interactions with undergraduate students, even if consensual, are inappropriate and prohibited. The purpose of this policy is to assure healthy professional relationships. This policy is not intended to discourage consensual intimate relationships unless there is a conflicting professional relationship in which one party has authority over the other as in the policy.

20.10 CHILDBIRTH/ MATERNITY ACCOMMODATION PROTOCOL

<https://www.cmu.edu/graduate/programs-services/maternity-accommodation-protocol.html>

Students whose anticipated delivery date is during the semester may consider taking time away from their coursework and/or research responsibilities. Any student who gives birth to a child while engaged in coursework or research is eligible to take either a short-term absence or formal leave of absence. 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 appropriate academic contact(s) (advisor, associate dean, etc.) may be reviewed during this meeting.
- Students in course work should consider options for the semester of the anticipated birth such as working with their course instructors to receive incomplete grades, electing to drop to part-time status or taking a full 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 and for resuming upon return.
- Master's students who receive an academic stipend funded by Carnegie Mellon are eligible to continue to receive stipend funding for up to six (6) weeks during a Short-Term Maternity Accommodation or a Formal Leave of Absence. Continued academic stipend funding may be extended by two (2) weeks, for a total of eight (8) weeks if an absence longer than six weeks is medically necessary. To receive this support students must be registered with the Office of the Dean of Students.

20.11 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 <https://www.cmu.edu/policies/student-and-student-life/grading.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.

20.12 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. The entire process for taking a leave and returning from a leave can be found at: <https://www.cmu.edu/hub/registrar/leaves-and-withdrawals/> .

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 allow students to return only at the beginning of a semester (usually late August or early January).

20.13 WITHDRAWAL OF A DEGREE

The university reserves the right to withdraw a degree even though it has been granted should there be discovery that the work upon which it was based or the academic records in support of it had been falsified. In such a case, the degree will be withdrawn promptly upon discovery of the falsification. The complete reference to this university policy is available at: <https://www.cmu.edu/policies/student-and-student-life/withdrawal-of-a-degree.html> .

20.14 PROGRAM WITHDRAWAL

Process for 'Withdrawal' from a program: <https://www.cmu.edu/hub/registrar/leaves-and-withdrawals/>

20.15 ENROLLMENT VERIFICATION

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

Enrollment verification must be requested online through The HUB at: <https://www.cmu.edu/hub/registrar/student-records/verifications/enrollment.html>.

21 EMPLOYMENT

Master's programs are not funded by the Robotics Institute. Students are welcome to apply for external funding opportunities and/or discuss potential Research Assistantships with their research supervisor.

Additional information on external funding can be found via the Fellowships and Scholarships Office available on-line: <http://www.cmu.edu/fso>.

21.1 EMPLOYMENT ELIGIBILITY VERIFICATION

If you are receiving a stipend, are going to be a TA or you are planning to have a position with CMU then Employment Eligibility Verification is required.

To ensure compliance with federal law, Carnegie Mellon University maintains the Employment Eligibility Verification (I-9) Policy [pdf] covering the university's I-9 and E-Verify requirements:

- The Form I-9 must be completed on or before your first day of work for any type of compensation (stipend or employment).
- Individuals who expect to work on a federally funded project are further responsible for submitting an E-Verify Processing Request Form to the Office of Human Resources.

For more information, please see CMU's Guidance for Completing the Form I-9 and E-Verify Requirements at CMU [pdf] or visit the Human Resources Service website to learn more about Form I-9 and E-Verify and to schedule an appointment to complete the Form I-9."

21.2 CONSUMER INFORMATION

Carnegie Mellon University suggests that all current and prospective students be informed consumers. Please see this link for detailed consumer information: <https://www.cmu.edu/hub/consumer-information/>.

21.3 REPORTING INCOME / TAXES

The deadline for local, state, and federal taxes is April 15. Questions about your tax status should be addressed to the IRS or the Pennsylvania Department of Revenue. Although subject to federal taxes, student stipends are generally not assessed local or state taxes.

22 FUNDING

22.1 INTERNAL FUNDING OPPORTUNITIES THROUGH CARNEGIE MELLON

CMU University Financial Aid Office - <https://www.cmu.edu/sfs/financialaid/graduate/index.html>

22.1.1 Departmental Assistantships

- **Research** - Research assistantships (R.A.s) are provided by projects which are funded by government agencies, private industries, and consortia. R.A.s will be expected to conduct appropriate research under the direction and guidance of their research advisor. R.A. positions can cover tuition and/or a monthly stipend, they are not paid hourly. Health insurance and activities fees are always the responsibility of the student.
- **Teaching** - Teaching assistantships (T.A.'s) are awarded to faculty members who then award these positions to selected students. Teaching assistant duties include, but are not be limited to, holding office hours, conducting recitation classes, and grading. There are minimum English proficiency requirements that must be met in order for a student to accept a teaching assistantship. Pennsylvania state law requires that all students who are not native speakers of English take and pass a state administered proficiency test. Support for teaching activities can be found through the Eberly Center for Teaching Excellence. Students who will be T.A.s for the department are encouraged to visit the Teaching Center and to take advantage of the information and services located there.

Departmental assistantships are renewable based on a student's acceptable performance in course work and research and availability of funds. If support is through an external grant or contract, and this funding is lost, reduced, or changed, the advisor will notify the student accordingly. All efforts will be made to facilitate the student's continuation in their degree program if the student is progressing in an acceptable manner.

22.1.2 GuSH Research Funding

GuSH Research Funding is a source of small research grant funds provided by GSA and the Provost's Office and managed by the Graduate Education Office. Students can find more information about the application process and deadlines at: <https://www.cmu.edu/>

22.1.3 Fellowships

Students who are interested in applying for external fellowships should see their advisor or check the on-line information provided by the Office of Scholarships and Fellowships Web site. The Web site is an excellent resource for locating an abundance of information regarding available funding for students.

22.1.4 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).

22.2 EXTERNAL FUNDING OPPORTUNITIES

22.2.1 U.S. Department of Education Resources

- U.S. citizens and permanent residents may complete the Free Application for Federal Student Aid (FAFSA) on line at <https://fafsa.ed.gov/>
- Students may obtain information regarding their loans through the William D. Ford Direct Loan Program, including deferment forms and payment information at <http://www.dlsonline.com/index.asp>.
- Information about the federal student aid programs may be found at www.studentaid.ed.gov.

22.2.2 Fellowships and Grants

- National Science Foundation: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=6201
- Fellowship resources compiled by the National Association of Fellowship Advisors: <http://www.nafadvisors.org/scholarships.htm>

22.2.3 Outside Employment

Students are not allowed to be employed outside of the university during the academic year nor during the summer if they are being supported by the department.

22.2.4 Loans

Students who hold American citizenship or who are permanent residents of the United States may submit the Free Application for Federal Student Aid (FAFSA) so that the Office of Financial Aid may determine their eligibility for loans through the William D. Ford Direct Stafford Loan Program. International students with a credit worthy US cosigner may apply for private educational loans through Citibank's Citiasist Loan Program.

Grad PLUS

Effective July 1, 2006 a graduate or professional student may be eligible to borrow a Federal Graduate PLUS Loan. This loan allows you, not your parents, to borrow up to the cost of attendance less any other financial aid you receive. It has a fixed interest rate of 8.5%, and no aggregate limits. You must be a US citizen or permanent resident to qualify. Credit checks are also required to determine eligibility, but the credit criteria are much less stringent than for most private alternative loans. If you don't meet the credit criteria you may still obtain the loan with an "endorser" who does meet the credit requirements. PLUS applicants cannot have adverse credit based on a review of at least one credit report from a national credit reporting agency. Adverse credit is defined as:

- No Federal Student Aid loans in default or delinquent status
- No accounts that are 90 days or more past due
- No evidence of default, foreclosure, tax lien, repossession, wage garnishment, or judgments in the last 5 years
- No accounts in collection
- No accounts that were "write-offs" or never able to collect upon A lack of credit history or insufficient credit history is not considered adverse credit.

Creditworthiness is not based on a FICO score, debt to income ratio, or annual salary. You must complete a FAFSA and have applied for your annual loan maximum eligibility under the Stafford program first. You will also have to complete a Master Promissory Note (MPN) and Addendum for this loan.

If you decide to apply for the GRAD PLUS loan here at SAIS, here are the instructions: You will need to log into <http://www.asa.org>. You will need to follow the instructions for applying for the GRAD PLUS loan and be sure to complete your Master Promissory Note. A drop-down list of our preferred lenders will pop up for your convenience. Preferred lenders have been chosen because of the benefits that they offer our students and in addition, will not charge the 1% default fee mentioned in the attached comparison chart. If you choose to go with an outside lender, please keep in mind that there is a possibility that you may be charged a 1% default fee.

Private

(Note: links throughout the rest of this section have not been verified or updated by Graduate Education)

Students who need additional funds beyond the financial aid package offered by SAIS have the option to borrow funds through a private lender. These loans are credit based, so applicants may need a cosigner. International students may utilize private lenders if they have a US citizen or permanent resident as a cosigner.

22.2.5 Other Resources

The following websites are available for researching other sources of financial aid. Please be sure to pay close attention to the stated application deadlines.

www.finaid.com www.collegeinfo.org www.fastweb.com www.SALLIEMAE.COM
www.MACH25.com www.Fastaid.com www.Wiredscholar.com

College Board Scholarship Search

Fellowship Resources Compiled by the Soros Fellowship: <http://www.pdsoros.org/links.html>

National Association of Fellowship Advisors: <http://www.nafadvisors.org/scholarships.htm>

22.3 SOURCES OF FINANCIAL AID FOR INTERNATIONAL STUDENTS

The following information is designed to help international students in the search for additional sources of financial aid for attendance at SAIS. This list includes a Fellowship Program from the Institute of International Education, several Loan Programs, and relevant websites and online sources of information.

22.3.1 Institute of International Education (IIE)

The IIE is a nonprofit organization that promotes international education. They provide information about the Fulbright Program on their website: www.iie.org. Number and amount of grants differs from country to country. They also publish several useful guides, including Funding for US Study: A guide for Foreign Nationals, English Language Orientation Programs (a guide to ESL programs in the US), and Academic Year Abroad. Books can be ordered through e-mail to iie-books@iie.org. You may also write to: Institute of International Education (IIE), 809 United Nations Plaza, New York, NY 10017-3580.

22.3.2 Ford Foundation International Fellowship Program (IFP)

The Foundation sponsors three minority graduate fellowship programs - predoctoral, doctoral, and postdoctoral through the National Research Council. For information write or call the: National Research Council, 2101 Constitution Avenue, Washington, DC 20418. Or phone: (202) 334-2872

The IFP provides support for up to three years of formal graduate-level study. Fellows will be selected from countries in Africa and the Middle East, Asia, Latin America, and Russia where the foundation maintains active overseas programs. U.S. nationals are not eligible, although fellows may study in the United States. IFP Fellows must be nationals of eligible countries.

Please refer to the following website for more detailed information concerning the application process, eligible candidates, and IFP requirements: www.fordfound.org

22.3.3 Additional International Student Funding Resources

International students may find the information on the websites below helpful in researching funding sources:

www.internationalscholarships.com www.educationusa.state.gov

Native Leadership Scholarship (women only) - <http://www.onsf.uconn.edu/find-scholarships/opportunities-for-non-us-citizens/>