

The Robotics Institute

2014

Master of Science in Robotic Systems Development (MRSD)



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Welcome!

A Note from the MRSD Program Director...

On behalf of the faculty, staff, and current students of the Robotics Institute (RI) I would like to welcome you to the family.

The Master of Science (MS) degree in Robotic Systems Development (MRSD) is a unique advanced graduate degree program. This Master's degree program distinguishes itself from any other offered program by teaching the multidisciplinary know-how and skills in the fields of technology and business needed to succeed in today's world.

The faculty and staff of RI will function not only as mentors and facilitators, but also coworkers in this process. This handbook serves as your road guide.

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 this handbook.

Warm Regards,

A handwritten signature in blue ink that reads "Hagen Schempf". The signature is fluid and cursive, with the first name "Hagen" and last name "Schempf" clearly legible.

Hagen Schempf, PhD
Principal Systems Scientist
MRSD Program Director

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/academic-integrity
- University Policies Website: www.cmu.edu/policies/
- Graduate Education Website: <http://www.cmu.edu/graduate/policies/index.html>

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.

The Statement of Assurance can also be found [on-line](#).

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](#).

1. Directory

A. Department Contacts

Program Director	Hagen Schempf	x6884	Internship placement, project design, career advising
Academic Coordinator	Julie Goldstein	x4017	General advising and graduate student assistance, program admissions
Administrative Support	Sumitra Gopal	x3818	Purchasing support

B. University Contacts

Office of the Assistant Vice Provost for Graduate Education (AVPGE)	Suzie Laurich-McIntyre	Graduate Student Academic Support/ Advocacy, Diversity Recruitment and Programming, Graduate Policy, Graduate Student Service Awards, Professional Development Seminars, Conference Funding, Small Internal Research Awards Diversity Programming, Graduate Women's Gatherings, General Graduate Student Support/ Advocacy
Division of Student Affairs		General Graduate Student Support/ Advocacy, Emergency Intervention
Office of International Education (OIE)	Carly Devenburgh	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

C. Abbreviations

CIT	College of Engineering
CMU	Carnegie Mellon University

GHC	Gates Hillman Center
GPA	Grade Point Average
GSA	Graduate Student Assembly
HC	Heinz College
ICC	Intercultural Communication Center
ITA	International Teaching Assistant
LOA	Leave of Absence
MRSD	Master of Robotic Systems Development
NSH	Newell Simon Hall
OIE	Office of International Education
PCHE	Pittsburgh Council on Higher Education
RI	Robotics Institute
SCS	School of Computer Science
SIO	Student Information Online
TA	Teaching Assistant/Assistantship
TSB	Tepper School of Business

2. Departmental Policies

A. Department Directory

A comprehensive listing of all Robotics Faculty, Staff and Students can be found on the [People of RI](#) website. General contact information for faculty, students and staff affiliated with CMU can be found via [directory search](#).

B. Bulletin Boards and Email Distribution Lists

Students are welcome to post flyers, advertisements, etc. to any bulletin board in Newell Simon Hall (NSH) common spaces (i.e. outside of elevators). MRSD students may use the e-mail distribution list to communicate messages to one another; a new list is created for each incoming class of students – see the MRSD Academic Coordinator for details. Students wishing to send e-mail messages to groups outside of the MRSD program should ask the Academic Coordinator for guidance in selecting the appropriate distribution list.

C. Computing Facilities

Students should use the on-campus computing facilities offered by [Computing Services](#). There are several Computer Clusters located around campus – a full list can be found [here](#). Students should adhere to the [Computing Policies and Guidelines](#) as outlined by the University.

D. Copy Machine and Fax Availability

MRSD students will be given access to the RI printer and copy machine on either the 3rd or 4th floor of NSH. Upon arriving on-campus in the fall students will be emailed a personalized copy code. This code will allow students to print, make copies, scan documents and send faxes free of charge. Instructions on installing the print drivers will be emailed to students at the start of the fall term. Using the copy machine is a privilege and should be treated as such. Students should clear paper jams and re-load paper as needed. Any issues with the copy machine should be promptly reported to the MRSD Academic Coordinator.

E. Lab Space

The MRSD Project-Lab space is accessible exclusively to MRSD students (and their TAs) for use to support their hands-on work required as part of the MRSD Project Course. Dual-person lab-benches, arranged in 4-person teams are located in the dual-room space in NSH B506. Rules and regulations, conduct and obligations of MRSD students using these spaces will be provided to students during their initiation period and by the lead faculty member teaching the MRSD Project Course. As with all CMU interactions, we expect MRSD students to interact with each other and maintain their workspace and the lab-space and tools/supplies, to a high professional standard.

In addition to the designated lab space, MRSD students are welcome to use the RI Graduate Collaboration Suite, located in NSH 4228. Students may also use the Robotics Lounge (RoboLounge) located in NSH 1513.

F. Key Distribution

Upon matriculation MRSD students will receive a number of keys from the Academic Coordinator. Students will have key access to NSH, GHC and the MRSD student work space (NSH B506). It is up to the student to keep track of all keys and to return them to the MRSD Academic Coordinator prior to leaving Pittsburgh at the end of the program. Lost keys should be reported to the MRSD Academic Coordinator right away.

G. Locker Rental

RI students may elect to rent a locker on the 4th floor of NSH to store their belongings. Students who wish to rent a locker should see the MRSD Academic Coordinator. Students are required to complete a Locker Usage Agreement and to submit a \$25.00 non-refundable usage fee and a \$25.00 key deposit prior to obtaining a key. If the locker key is lost, the \$25.00 deposit will not be returned. Students requesting additional keys for the locker will be required to submit a \$25.00 deposit for each key. Upon return of the key, the student will be reimbursed the \$25.00 deposit. The RI is not liable for materials stored in the lockers. Students may not store open liquid containers, perishables, flame producing

objects or live animals in the lockers. The RI staff maintains keys to all lockers and has the right to open any locker at any time as deemed necessary.

H. Purchasing and Reimbursement Procedures and Policies

MRSD students will need to make purchases on a fairly regular basis for the MRSD Project Course. The default method for purchasing is to go through Sumitra Gopal (NSH 4000B).

Each team will designate a "team purchaser" who will develop orders to be purchased by Sumitra. Once the team purchaser is chosen, students should e-mail the MRSD Academic Coordinator with that person's Google Mail (g-mail) ID. A Google Drive spreadsheet will be created and shared with each team purchaser once their g-mail ID is received. Team purchasers will then fill out the appropriate fields in their team spreadsheet when they need things purchased. Sumitra will place orders three times week on Monday, Wednesday, and Friday no later than 3:30 p.m.

For the best results, students should follow these guidelines:

- Order from reputable sites
- Check on shipping duration; for example, Hong Kong sites are cheap but can take as long as 3 weeks to ship
- If you think you may need the same parts as other teams or are ordering from the same vendor, try to order at the same time so the orders can be consolidated to save on shipping

Students should attempt to make all purchases through Sumitra. Prior to making an MRSD purchase with personal funds, the student should discuss their intentions with the MRSD Academic Coordinator to ensure that the business purpose is relevant and reimbursable. Once the purchase has been cleared by the Academic Coordinator the student may move forward with the acquisition. Promptly following the purchase the student should drop the original, itemized receipt off to the MRSD Academic Coordinator so that the reimbursement can be processed.

I. Security, Repairs and Services

Students should inform the MRSD Academic Coordinator of any non-emergency issues related to building security or repairs. If a student feels like he/she is in immediate danger [Campus Police](#) should be called at 412-268-2323.

J. Graduate Student Organizations

The RI encourages graduate students to join organizations at CMU.

The University sponsors the [Graduate Student Assembly \(GSA\)](#) which is the branch of student government that represents all graduate students at CMU. In addition to working with other members of student government, university administration, and external advocacy groups, GSA is responsible for planning a variety of social events throughout the year. GSA maintains an e-mail distribution list that students can subscribe to called [GSA-Happenings](#).

The SCS is pleased to sponsor [Women@SCS](#) and [Dec\5](#). Women@SCS aims to create, encourage, and support academic, social, and professional opportunities for women in computer science and to promote the breadth of the field and its diverse community. Dec\5 is a social organization that encourages interaction between different Departments and Industry partners within SCS.

[RoboOrg](#) is the graduate student organization of the RI. It organizes social events, trips, maintains the RoboLounge, and is also involved in the strategic long-term planning of the RI. MRSD students are encouraged to volunteer 1-2 representatives to work with RoboOrg in an active role.

K. New Policies

When policies are changed it is because the department believes the new rules offer an improvement. Currently enrolled students whose degree program is affected by a change in policy may choose to be governed by the old policy

that was in place at the time of their matriculation or the new policy. 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.

L. Community Spirit

Our sense of community is well-known as a distinguishing aspect of studying robotics at CMU. It is one of the reasons many students choose to come here. The RI is proud of our strong community spirit, which we foster through close working relationships between students and advisors, among faculty, and among students. Many working relationships turn into friendships for life. Luckily, our community works. People volunteer their time, energy, intellect, talent, and other skills to do many of the things that keep our environment running smoothly. These efforts include organizing seminars, serving on departmental committees, being a host during Open House, planning and running social activities, and giving tours. MRSD students are encouraged to get involved in the RI community!

3. Academic Policies

A. Statute of Limitations

Per [University Policy](#), Students will complete all requirements for the Master's degree within a maximum of seven years from original matriculation as a Master's student. Once this time-to-degree limit has lapsed, the 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 extenuating circumstances, such as leave of absence, military or public service, family/parental leave, or temporary disability, a college/school may, upon the relevant department's recommendation and with the written approval of the dean (or designate), defer the lapse for a period commensurate with the duration of that interruption. Students pursuing the Master's degree as part-time students for all semesters of their program, as approved by their program, may also appeal to their program or department for extension of the time to degree limit.

B. Full-time Status and Part-time Status

The MRSD program is designed as a full-time program to be completed in 16 months. To maintain full-time status, the student must register for a minimum of 36 units per semester. Students with less than 36 units are considered part-time and will be assessed tuition on a per unit basis.

The MRSD program offers part-time enrollment at the discretion of the Program Director. The part-time candidate must apply and be accepted into the MRSD program, and commit to completing the entire curriculum within the statute of limitations (see section 3A). The MRSD program will not accept enrollment of non-MRSD (accepted) students in any of its core courses.

Graduate students who are registered as full-time students as of the 10th day of classes are expected to remain full-time for the duration of the semester. Permission to drop below the 36 unit minimum must be granted by the MRSD Program Director. Students who are registered part-time are subject to the same deadlines to drop or withdraw from a course.

C. Department Registration Process and Procedures

MRSD students are responsible for managing their registration via [Student Information Online](#) (SIO).

- Core Courses: The MRSD Academic Coordinator will register students for all core courses.
- Technical Electives: Students should manage their own registration for Technical Electives.
- Business Electives: Students taking Business Elective(s) from the Heinz College (HC) should register for the course and/or add themselves to the waitlist. The MRSD Academic Coordinator will work with HC to enroll students from the waitlist. Students taking Business Elective(s) from the Tepper School of Business (TSB) should send an email to the MRSD Academic Coordinator outlining the courses they plan to register for. The MRSD Academic Coordinator will work with the TSB to enroll students for the course(s).

D. Residency Requirements

Due to the collaborative nature of the MRSD Program, students are required to complete the degree requirements in their entirety at the Carnegie Mellon University - Pittsburgh campus. MRSD does not offer an option for distance learning, as a result the student(s) are required to be present on campus to complete all course requirements; the optional internship will, in many cases, be carried out at an off-site location with an approved industrial partner.

E. Double Counting Courses

Students in the MRSD program are prohibited from double counting courses. A course that has been counted towards another degree cannot be counted towards fulfilling course requirements for MRSD. Courses may not count for more than one requirement within the Master's program.

F. Courses Outside of the Curriculum

The MRSD program curriculum is designed to occupy a student's full-time effort. Students who wish to enroll for additional courses outside of the curriculum will be charged for the extra courses on a per unit basis (see section 5H). Due to the intensive and collaborative nature of the program, the MRSD Program Office cautions students against enrolling in extra coursework.

G. Incomplete Grades

MRSD students are expected to complete all courses during the academic semester in which the course is taken. However, if the instructor agrees, a grade of "I" (incomplete) may be given when a student, for reasons beyond his or her control, is unable to complete the coursework, but the work completed to date is of passing quality and the grade of incomplete provides no undue advantage to that student over other students.

In awarding an "I" grade, an instructor must specify the requirements for completing the work and designate a default letter grade that will be assigned if no further work is submitted. Students must complete the required coursework no later than the end of the following academic semester or sooner if required by prior agreement. The instructor must record the permanent grade by the last day of the examination period of that following semester. Failure to do so will result in Enrollment Services administratively assigning the default grade.

H. Withdrawing/Dropping Courses

Students at CMU may drop a course through SIO on or before the drop deadline as published in the official university [academic calendar](#). When a course is dropped by the designated deadline, the course is removed and does not appear on the academic record. After the deadline to drop, students may withdraw from a course by accessing SIO on or before the last day of class, prior to the beginning of final examinations. After the deadline to drop, a "W" (withdrawal) grade is assigned and appears on the student's academic record.

Due to the structured curriculum for the MRSD program students are discouraged from dropping or withdrawing from courses. Prior to dropping/withdrawing from a course the student should consult with the MRSD Program Director and Academic Coordinator to confirm that this is the best option. Students will be required to make-up the dropped course at a later date in order to be eligible for graduation.

I. Waiver Policy

At the discretion of the MRSD Program Director, a student may be permitted to waive a core course requirement. Should a student obtain a waiver for a core course, he/she will still be responsible for completing 162 units. Essentially, the student would be permitted to take an approved elective in place of the core course.

Waivers will be considered if (1) the student provides sufficiently detailed descriptions of the previously taken course (syllabus, etc.), (2) the student would be willing to take and successfully pass a commensurate final exam in the offered MRSD course, as given by the course instructor, and (3) the student would be willing to successfully pass a verbal and interactive discussion/review/test on the various subjects taught in a particular course, as administered by the respective faculty instructor.

Students should operate on the assumption that these waivers will not be approved, and that such consideration will only be given at the sole discretion of the MRSD Program Director. Due to the variety of course content, university teaching levels and foreign/national standard differences, the chances of obtaining a waiver are extremely limited. The MRSD courses are tailored to a specific content not typically available in other courses making it difficult to waive requirements based on previous coursework.

J. Transfer Courses

Due to the variety of course content, university teaching levels and foreign/national standard differences, the MRSD program will **not** allow students to transfer previously taken, uncounted courses to meet the core courses or elective

requirements. The MRSD courses are tailored to a specific content not typically available in other courses making it difficult to allow the transfer of previous coursework.

K. PCHE

CMU offers students the opportunity to take courses for credit through the [Pittsburgh Council on Higher Education \(PCHE\)](#) cross-registration program. The CMU transcript will include information on such courses taken through PCHE and grades will be recorded on the transcript to be factored into the GPA. University policy stipulates that students are not permitted to participate in the PCHE program during the final semester at CMU. With the approval of the Program Director, MRSD students are permitted to enroll in up to one relevant elective course through the PCHE program.

L. Grading Policy

The CMU grading policy is outlined on the [University Grading Policy](#) website. MRSD students will be awarded a letter grade for all core courses, project courses and electives. Students must earn a grade of “B-” or better in all core courses in order for the course to count towards the MRSD degree requirements. Students must maintain a GPA of 3.0 or higher to retain good standing in the program. Students dropping below a 3.0 will be required to meet with the MRSD Program Director to develop a plan for improvement. Students failing to rise above a 3.0 in the subsequent semester will be terminated from the MRSD program.

Pass/fail grades are not permitted for formal coursework used to satisfy MRSD requirements. Audit grades are not permitted for courses used to satisfy MRSD requirements.

Should a student receive a grade that is less than satisfactory (i.e. below a “B-”) in a core class he/she will be required to retake the course at a later date. Students failing to obtain a grade of “B-” or better on the second attempt will be terminated from the MRSD program.

M. Academic Integrity

CMU, The Robotics Institute and the MRSD program take a serious approach to academic integrity. The MRSD program adheres to the academic integrity policies set forth by CMU. Students should review and familiarize themselves with the Universities [policy](#) and expectations for [Academic Integrity](#).

The consequences of an academic integrity violation vary depending on the severity of the incident. However, there are several outcomes that impact students during their time on campus that are common to all cases regardless of the particular details of the offense. Consequences for Academic Integrity violations are outlined [here](#).

Students accused of violating the academic integrity policy should review the [Responding to Violations](#) webpage to identify the best way to move forward.

N. Teaching Assistantships

MRSD students are not required to complete a Teaching Assistantship (TA). In rare cases, a professor may ask a student to work as a TA for their course. Before accepting such an offer MRSD students are required to obtain permission from the MRSD Program Director. MRSD students are only eligible to TA in their 3rd and final semester. MRSD students who work as a TA will receive compensation.

Graduate students are required to have a certain level of fluency in English before they can instruct in Pennsylvania, as required by the [English Fluency in Higher Education Act of 1990](#). Through this Act, all institutions of higher education in the state are required to evaluate and certify the English fluency of all instructional personnel, including teaching assistants and interns. Prior to working in the classroom non-native English speakers are required to complete the International Teaching Assistant (ITA) exam via the Intercultural Communication Center (ICC). Testing will be arranged by the MRSD Academic Coordinator.

O. Switching Programs

MRSD students are free to apply for other RI degree programs at any point in their academic career. Students should note that the MRSD program is a professional Master's degree, intended to provide a mix of technical and business training to individuals interested in entering industry careers. The MRSD program should not be viewed as a preparatory or stepping-stone degree program for the RI PhD program, but rather as a stand-alone degree program for those primarily interested in a professional career track.

Admission to the MRSD program does not in any way signify admission to other RI degree program. Each of the RI's graduate programs (MS, MRSD, MS-RT, PhD) are separate and have their own application steps, admission criteria, selection processes and admission decisions.

P. Leave of Absence

Students must sometimes interrupt their studies for a variety of reasons. CMU defines a Leave of Absence (LOA) as leaving the University temporarily with the firm and stated intention of returning (see [Student Leave Policy](#)). Students who wish to take a LOA must state their intentions in writing to the MRSD Program Director and Academic Coordinator. Upon receiving the written request the MRSD Program Office will contact the student to discuss their plans while on leave and to work out any conditions that may be necessary for a smooth return to CMU. Once all parties are in agreement that LOA is the best way to move forward the student will be required to complete a [Leave of Absence \(.pdf\)](#) form. The form must include **all** necessary signatures or the process will not be completed.

Students take a LOA before completing 60% of the semester will be charged tuition based on the number of days completed within the semester (see [Tuition Adjustments](#)). There is no adjustment of the media fee, transportation fee, technology fee or student activities fee. Students needing an adjustment to the health assessment fee must contact [Student Health Services](#).

Students wishing to return from LOA to resume their studies should follow the [Return from Leave Policy](#) and complete a [Return from Leave of Absence \(.pdf\)](#) form.

Please note that all degree requirements must be completed before the Statute of Limitations for MS students (see section 3A).

Q. Withdrawing from Degree Program

CMU defines a withdrawal as leaving the University with no intention of returning (see [Student Leave Policy](#)). Students who wish to withdraw from the CMU MRSD program must state their intentions in writing to the MRSD Program Director and Academic Coordinator. The student is then required to complete the [Withdrawal \(.pdf\)](#) form. The form must include **all** necessary signatures or the process will not be completed.

Students who withdraw before completing 60% of the semester will be charged tuition based on the number of days completed within the semester (see [Tuition Adjustments](#)). There is no adjustment of the media fee, transportation fee, technology fee or student activities fee. Students needing an adjustment to the health assessment fee must contact [Student Health Services](#).

R. Advising

Due to the professional focus of the MRSD program students are not formally assigned a faculty advisor. Student progress is overseen by the MRSD Program Director and Academic Coordinator. Students are welcome and encouraged to seek out students and faculty for specific technical guidance if required.

S. Vacations and Time-Off

Students are expected to follow the [academic calendar](#) to determine vacation time

T. Protocol for Review of Academic Conflicts

Graduate students should refer to the [Graduate Student Appeal and Grievance Procedures](#) for a summary of processes available to graduate students who seek review of academic and non-academic issues. Graduate students are expected to seek informal resolution of all concerns within the Department, unit or program before invoking formal processes. When an informal resolution cannot be reached, a graduate student who seeks further review of the matter is to follow the formal procedures as outlined. The 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. 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.

4. Academic Requirements

A. Course Requirements

The degree requirements for students in the MRSD Program consist of core courses, project courses, business seminars and business/technical electives. To be eligible for degree certification students must complete a minimum of 162 units of MRSD coursework. The curriculum is comprised of three semesters of coursework (9 months) and an **optional** industrial internship/practicum (3 months in the summer), resulting in a 16-month long program.

1st Semester - 1st Fall Term:

- 1st core course: Systems Engineering and Management for Robotics (16-650)
- 2nd core course: Manipulation, Mobility & Control (16-642)
- One elective course – Technical or Business
 - Technical: approved graduate level course from SCS, CIT
 - Business: approved graduate level course from HC or TSB
- One Project Course: MRSD Project I (16-681)
- One Business Course: MRSD Seminar I (16-697)

Students will complete 57 units in the first semester.

2nd Semester - Spring Term:

- 3rd core course: Computer Vision (16-720)
- 4th core course: Robot Autonomy (16-662)
- One elective Course – Technical or Business
 - Technical: approved graduate level course from SCS, CIT
 - Business: approved graduate level course from HC or TSB
- One Project Course: MRSD Project II (16-682)
- One Business Course: MRSD Seminar II (16-698)

Students will complete 57 units in the second semester.

Summer Term:

Optional Internship with a technical company (16-991) – 3 units

3rd Semester - 2nd Fall Term:

- Three Technical Electives
- One Business Elective

Students will complete 48 units in the third semester.

The matrix of courses and deliverables (exams, presentations, demonstrations, etc.) are as shown in the figure below. Detailed course descriptions for core courses can be found on the [MRSD Program Curriculum](#) website and will be updated regularly to reflect changes. Note that the number of units listed for each course is meant to provide a guideline of the number of hours spent on each course in a given week; however, this number is meant purely as a guide. Many times students have spent far more time on researching the background materials, meeting in team-settings, doing homework and/or lab work, depending on their background and complexity and breadth/depth of the project or solution being implemented.

162 Units								
Intro	Aug	1 week (2nd week)	CMU Foreign Graduate Student Orientation <i>(Foreign Students ONLY)</i>					
		1 week (3rd week)	Incoming Student Orientation & Robotics Boot Camp <i>(Robotics Institute - All Students)</i>					
			Core Course 1 & 3	Core Course 2 & 4	Electives 1 & 2	Project I & II	Mini Course <i>(Seminar-Style)</i>	
1 st Semester	Aug-Dec	Fall Semester	16-650 Systems Engineering & Management <i>(12 Units)</i>	16-642 Manipulation, Mobility & Control <i>(12 Units)</i>	XX-xxx Technical/Business Elective 1 <i>(12 Units)</i>	16-681 MRSD Project I <i>(12 Units)</i>	16-697 MRSD Business Seminars I <i>(9 Units)</i>	
	Dec	Finals <i>(mid-month)</i>						Draft of Feasibility Report
2 nd Semester	Jan-Apr	Spring Semester	16-720 Computer Vision <i>(12 Units)</i>	16-662 Robot Autonomy <i>(12 Units)</i>	XX-xxx Technical/Business Elective 2 <i>(12 Units)</i>	16-682 MRSD Project II <i>(12 Units)</i>	16-698 MRSD Business Seminars II <i>(9 Units)</i>	
	May	Finals <i>(~1st week)</i>						Final Technical Report Submittal
		TDP Plan <i>(~2nd week)</i>						Group Presentation & Demonstration
		Project <i>(~2nd week)</i>						Group Presentation & Demonstration
		Break <i>(last week)</i>						-
Internship	Jun - Aug	Praktikum OPTIONAL	16-991 - Practicum - MRSD Project III <i>Practicum with Industry, Government Lab or other R&D Facility</i> OPTIONAL <i>(Full-Time Summer = 3 Units)</i>					
			RI-only Elective 3	RI-only Elective 4	SCS/CIT/Other Elective 5	Business Course <i>(Seminar-Series or Business Elective)</i>		
3 rd Semester	Aug-Dec	Fall Semester	16-xxx Technical Elective 3 RI only <i>(12 Units)</i>	16-xxx Technical Elective 4 RI only <i>(12 Units)</i>	XX-xxx Technical Elective 5 SCS/CIT or Other <i>(12 Units)</i>	16-699 MRSD Business Seminars III <i>(9 Units)</i>	or XX-xxx Business Elective 3 <i>(12 Units)</i>	
	Dec	Finals <i>(mid-month)</i>						

B. Electives

MRSD students are required to complete a total of 4 Technical Electives and 2 Business Electives. A list of pre-approved Technical Electives can be found on the MRSD [Curriculum](#) webpage. The MRSD Academic Coordinator will send a list of pre-approved Business Electives to students each semester via email. Courses included on the list do not require additional permission from the MRSD Program Director. Courses that are not included on the list do require written approval from the MRSD Program Director. To petition a course for degree inclusion the student must send an email to the MRSD Academic Coordinator that includes that course title, name of instructor and course description.

MRSD students are permitted to take up to 12 units of upper-level Undergraduate (XX-300/400 level) coursework for the degree. The MRSD program cannot guarantee the regularity in which electives will be offered – students should consult the [Schedule of Classes](#) to obtain this information.

- **Technical Electives:** In order to satisfy the Technical Elective requirement the student must complete electives that fit the following criteria.
 - At least two courses that are offered by RI exclusively (16-xxx course number)
 - At least one course that is exclusive to SCS
 - A maximum of one course that is outside of SCS – typically taken from CIT
- **Business Electives:** Each semester HC and TSB designate specific courses that MRSD students get priority enrollment for. The MRSD Academic Coordinator will circulate this list to students each semester via email. Should the student choose a Business Elective that is not a priority course the student will be required to follow

registration procedures as outlined by the home college/department. The MRSD Academic Coordinator will assist students with registration for MRSD priority courses (see section 3C).

C. Internship

While the MRSD curriculum does **not** require students to secure an internship in the summer between their 2nd and 3rd semesters, it is highly recommended that students obtain some form of practical real-world experience. The MRSD Program Office will actively support students in identifying and securing an internship with the [companies](#) listed on the MRSD website.

Participating companies/laboratories may provide brief overviews of their businesses and products to students allowing them to form an impression of their choice internship companies. The MRSD Program Office will work with students to compile a résumé book at the beginning of the first fall term, which will be distributed to key contacts within each of the companies listed as MRSD partners. Companies will then contact students directly if they have a need and see a fit, for phone/Skype or even on-site (at CMU or at the company) interviews. Note that students are not limited to the list of companies published on the MRSD site, but may also choose to find other (preferably high-technology) companies to apply to on their own. Students are further encouraged to participate in the multiple [Career Fairs and Career Events](#) on-campus offered by the CMU [Career and Professional Development Center](#), as this offers an excellent opportunity to meet-and-greet company representatives.

The student and the respective company are encouraged to enter into a separate and stand-alone contractual employment / internship arrangement spelling out the relevant employment conditions. The financial (or other) compensation arrangement is left to be negotiated between the student and the company itself. The MRSD Program Office will not intervene in these negotiations.

D. Progress Review

At the end of each semester the MRSD Program Office will review student grades to determine if program standards are being met. Students dropping below a 3.0 will be required to meet with the MRSD Program Director to develop a plan for improvement. Students failing to rise above a 3.0 in the subsequent semester will be terminated from the MRSD program. Should a student receive a grade that is less than satisfactory in a core class he/she will be required to retake the course at a later date. Students failing to obtain a grade of "B-" or better on the second attempt will be terminated from the MRSD program.

E. Degree Certification

Upon satisfactory completion of all degree requirements, the MS degree will be certified by the MRSD Academic Coordinator. As a result of the 16 month program timeline, the majority of students are certified at the end of the fall term. In rare cases, students are required to continue work into the spring semester, in these situations degrees will be certified at the end of the spring semester or upon completion of required deliverables.

Prior to degree certification students should review their unofficial academic records on [SIO](#) for missing or incomplete grades. Students should also check SIO to make sure there is not a student account balance. Any balance greater than zero will cause diplomas, degree verifications and transcripts to be financially held until the account is paid in full.

Students that are continuing studies at CMU in another Department or degree program must register for classes for the upcoming semester. Students who are not continuing their studies at CMU should not register for classes. The student's enrollment status will change to 'pending graduate' for the upcoming semester. This will prompt the system to remove upcoming charges, remove access for course registration and prompt expiration of the Andrew ID.

The university does not host a December commencement ceremony. Diplomas for December graduates are ordered in January and mailed at no cost to the student during the month of March. To ensure that diplomas are mailed to the correct place it is critical that students review and update the permanent address via the SIO Graduation and Diplomas

page. Students are invited to attend the SCS commencement ceremony in May – the MRSD Academic Coordinator will provide information about commencement to graduates via email.

5. Financial Policies

A. Departmental Financial Support

The RI does not offer financial support to MRSD students. Accepted students are expected to be fully self-supported, including tuition, fees, health insurance and any additional costs for books, supplies, room and board.

B. Student Fees & Health Insurance

Students are responsible for paying all fees in a timely manner. Failure to pay fees will result in the inability to register for subsequent semester and/or a hold on the student diploma. Students are required to maintain health insurance and are responsible for enrolling and paying the balance each year.

C. Travel & Conference Funding

MRSD does not provide funds for travel and/or conferences. Students may obtain funding for such activities via an application process sponsored by GSA and the Provost's Office. The process is managed by the Office of the Assistant Vice Provost for Graduate Education. Students can find more information about the application process and deadlines [here](#).

D. Additional Sources for Financial Support

In rare cases, students may be asked work as a TA, compensation will be provided (see section 3N).

E. Scholarship & Fellowship Opportunities

While the RI is not able to provide financial assistance, students are encouraged to identify scholarship and/or fellowship opportunities from external agencies. In particular, we encourage students to review and apply for [SMART Scholarships](#) funded by the Department of Defense.

Students may also review the on-line information provided by the CMU [Fellowship and Scholarship Office](#). This website is an excellent resource for locating an abundance of information regarding available funding for students.

F. Outside Employment

Due to the time consuming curriculum of the MRSD program students are not advised to accept employment while enrolled in the program as a full-time student. International students must contact the Office of International Education regarding ability to hold employment.

G. University Financial Aid

Graduate students should consult the graduate student financial aid information found [here](#). Students will find the Graduate Financial Aid Guide, information about funding options and 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 to inquire about a short-term [Emergency Student Loan](#) for supplies, medication, food or other unexpected circumstances. The emergency-based loan is an interest-free loan repayable within 30 days. Students seeking to make payments to their student account in intervals should consult the CMU [Payment Plan](#) website.

H. Per Unit Tuition Rate for Additional Courses

The MRSD Program Office discourages students from enrolling in additional coursework. The curriculum is designed to occupy full-time effort and the tuition is based on the standard curriculum (see section 3F). Students interested in enrolling in courses beyond the curriculum will be required to pay for the extra courses. The rate for the 2014-2015 academic year is \$667/unit.

6. Key Offices for Graduate Student Support

A. Office of the Assistant Vice Provost for Graduate Education

www.cmu.edu/graduate; grad-ed@cmu.edu

The Office of the Assistant Vice Provost for Graduate Education, AVPGE, directed by Suzie Laurich-McIntyre, 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 Student of Color Series (SOC)

B. Office of the Dean 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 Dean of Student Affairs Gina Casalegno, include:

- Career and Professional Development Center
- Counseling & Psychological Services (CAPS)
- Housing & Dining Services
- Orientation & First Year Programs (*note: for undergraduate students*)
- Office of International Education (OIE)
- Student Activities
- Student Life.

Holly Hippensteel, Assistant Dean of Student Affairs, serves as the point person in the division for graduate student resources and concerns. Graduate students will find the enrollment information for Domestic Partner Registration 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 the Dean of Student Affairs 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

Students with disabilities are encouraged to self-identify with Equal Opportunity Services by contacting Larry Powell, 412-268-2013, lpowell@andrew.cmu.edu to access the services available at the university and initiate a request for accommodations.

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. 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, and otherwise acts on behalf of all graduate student interests. GSA also plans various social opportunities for graduate students and maintains a website of graduate student resources on and off-campus, www.cmu.edu/stugov/gsa/resources/index.html. Each department has representation on GSA and the department rep(s) is the main avenue of graduate student representation of and information back to the graduate students in the department.

F. 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 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.

G. Office of International Education (OIE)

www.studentaffairs.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.

7. Key Offices for Academic & Research Support

A. Computing & 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.

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.

8. 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 at Carnegie Mellon or the larger Pittsburgh community. CAPS services are provided at no cost. Appointments can be made in person or by telephone, 412-268-2922.

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. There is a small visit fee to see the physicians and advanced practice clinicians; nurse visits are free of charge. Fees for prescription medications, laboratory tests, diagnostic procedures and referral to the emergency room or specialists are the student's responsibility. 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. It also covers most of the fees for care at Student Health Services. Graduate students should contact UHS to discuss options for health insurance for spouses, domestic partners and dependents. Appointments can be made by visiting UHS's website or by telephone, 412-268-2157.

C. 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 (additional information included in the Parking and Transportation section of The WORD, see below), fixed officer and foot officer patrols, event security, and crime prevention and education programming. Visit the department's website for additional information about the staff, escort and shuttle, emergency phone locations, crime prevention, lost and found, finger print services, and annual statistic reports.

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

D. The WORD

<http://www.cmu.edu/student-affairs/theword//>

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