

Computer Science MS Graduate Study Manual

2024 – 2025

Department of Computer Science

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2 Welcome!

We thank you for pursuing your graduate study with us in the Department of Computer Science (CS).

The goal of this manual, updated annually, is to provide a reliable authoritative guide to the CS Department requirements and policies for our MS program. We all work together to make the Department a supportive, inclusive, and enthusiastic community for world-class research and scholarly advancement.

Please don't hesitate to contact the graduate program coordinators or the DGS-MS whenever you need clarifications, advice, referrals, or just a sympathetic ear. We are here to help. Please contact and confer with us to ensure you stay connected with all the many people and opportunities afforded to you as part of Northwestern's graduate community.

This manual is maintained by the MS and PhD Directors of Graduate Studies in the Department of Computer Science. Our departmental policies are guided by our parent school, the McCormick School of Engineering and Applied Sciences (MEAS) and Northwestern's governing body for all graduate studies, The Graduate School (TGS).

Resource Links:

CS Dept: <https://www.mccormick.northwestern.edu/computer-science/>

CS academics: <https://www.mccormick.northwestern.edu/computer-science/academics/graduate/>

ECE Dept: <https://www.mccormick.northwestern.edu/electrical-computer/>

ECE academics: <https://www.mccormick.northwestern.edu/electrical-computer/academics/graduate/>

McCormick Graduate Programs: <https://www.mccormick.northwestern.edu/academics/graduate/>

The Graduate School (TGS): <https://www.tgs.northwestern.edu/>

Northwestern Student Affairs: <https://www.northwestern.edu/studentaffairs/index.html>

Office of International Students and Scholar Services: <https://www.northwestern.edu/international/>

Emails:

DGS-MS (Director of MS Graduate Studies and Admissions): Christopher Riesbeck: dgs-ms@cs.northwestern.edu, ms-admissions@cs.northwestern.edu

DGS-PhD (Director of PhD Graduate Studies): Konstantin Makarychev: dgs-phd@cs.northwestern.edu

DGA-PhD (Director of PhD Graduate Admissions): Jessica Hullman: phd-admissions@cs.northwestern.edu

Senior Graduate Program Coordinator: Madeleine Lantin: ms-student-help@cs.northwestern.edu

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Disclaimer:

Northwestern University reserves the right to change without notice any statement in this publication concerning, but not limited to, rules, policies, tuition, fees, curricula, and courses.

2.1 Diversity Statement

A diverse student population is a key element of the educational experience of students in The Graduate School (TGS). Diversity presents itself in many different forms such as: socioeconomic status, race or ethnicity, religion, gender, sexual orientation, nationality or place of origin, disability, unique work or life experience, etc. It is the goal of TGS to cultivate an environment that values diverse backgrounds, approaches, and perspectives — all essential ingredients for true academic excellence.

2.2 Nondiscrimination Statement

Northwestern University does not discriminate or permit discrimination by any member of its community against any individual on the basis of race, color, religion, national origin, sex, pregnancy, sexual orientation, gender identity, gender expression, parental status, marital status, age, disability, citizenship status, veteran status, genetic information, reproductive health decision making, or any other classification protected by law in matters of admissions, employment, housing, or services or in the educational programs or activities it operates. Harassment, whether verbal, physical, or visual, that is based on any of these characteristics is a form of discrimination. Further prohibited by law is discrimination against any employee and/or job applicant who chooses to inquire about, discuss, or disclose their own compensation or the compensation of another employee or applicant.

Northwestern University complies with federal and state laws that prohibit discrimination based on the protected categories listed above, including Title IX of the Education Amendments of 1972. Title IX requires educational institutions, such as Northwestern, to prohibit discrimination based on sex (including sexual harassment) in the University's educational programs and activities, including in matters of employment and admissions. In addition, Northwestern provides reasonable accommodations to qualified applicants, students, and employees with disabilities and to individuals who are pregnant.

Any alleged violations of this policy or questions with respect to nondiscrimination or reasonable accommodations should be directed to:

Northwestern's Office of Equity
1800 Sherman Avenue, Suite 4-500
Evanston, Illinois 60208
847-467-6165
equity@northwestern.edu

Questions specific to sex discrimination (including sexual misconduct and sexual harassment) should be directed to:

Northwestern's Title IX Coordinator in the Office of Equity
1800 Sherman Avenue, Suite 4-500
Evanston, Illinois 60208
847-467-6165
TitleIXCoordinator@northwestern.edu

A person may also file a complaint with the Department of Education's Office for Civil Rights regarding an alleged violation of Title IX by visiting

<https://www2.ed.gov/about/offices/list/ocr/complaintintro.html>

or calling 800-421-3481. Inquiries about the application of Title IX to Northwestern may be referred to Northwestern's Title IX Coordinator, the United States Department of Education's Assistant Secretary for Civil Rights, or both.

3 MS Program in Computer Science

This section discusses all academic aspects of the process of obtaining an MS degree in Computer Science from the Computer Science department. For information on the MS degree in Computer Engineering, see the Graduate Study Manual for the CE program:

<https://www.mccormick.northwestern.edu/electrical-computer/students/forms-documents.html>

We encourage MS students to assemble their own informal whole-degree study plans early and review them with the DGS-MS.

3.1 Advising

The DGS-MS is the default academic advisor for all CS MS students. Contact the DGS-MS or the CS Graduate Affairs Coordinator when you have any questions about courses, curricular requirements, or other matters.

3.2 MS Degree Plans

There are three degree plans available, described below. Plan C (course-only) is the default plan for every CS MS student. A student who wishes to do Plan A (thesis) or B (project) must identify an advisor and declare their plan in GSTS by the middle of their third quarter. Students doing the internship option need to declare this before the internship begins.

3.2.1 Plan A (Thesis)

In this plan, a student declares their intent to earn the MS degree by completing a formal thesis that reports substantial original research results. The thesis advisor must be identified when declaring this option. A second committee member should be found as soon as possible.

A successful thesis has two components: a written document and an oral defense of the research. These are judged by the thesis committee, headed by the thesis advisor. See [Section 3.3](#) for details.

Under this plan, a maximum of three units of COMP_SCI 590 research credit can be counted toward the 12-unit requirement for the MS degree.

3.2.2 Plan B (Project)

In this plan, a student declares their intent to earn the MS degree by completing a project and writing a project report that contains results based on existing theory and techniques or experimental verifications. The project advisor must be identified when declaring this option. A second committee member should be found as soon as possible. See [Section 3.3](#) for details.

Under this plan, a maximum of two units of COMP_SCI 590 research credit can be counted toward the 12-unit requirement for the MS degree.

3.2.3 Plan C (Course-only)

In this plan, the student must satisfactorily complete 12 graded courses. All courses must carry graduate credit. See [Section 4](#) for details.

3.2.4 Internship Option

With this option, the student must satisfy the requirements of Plan A, B, or C, and do one or two academic quarters of an internship. The student is responsible for arranging the internship. The internship must be approved by the McCormick Engineering Career Development office and assigned the appropriate CRDV course number.

This option is only required for internships taken in fall, winter, or spring quarter.

For more on internships, see [Section 8](#).

3.3 Committees

The Graduate School requires that every MS student have an examination committee to evaluate their work. The general requirements for committees are given here:

<https://www.tgs.northwestern.edu/academic-policies-procedures/policies/masters-degree-requirements.html#degree>

The three MS plans have different committee requirements:

- Plan A (Thesis): A CS faculty member must either be the primary advisor or an equal co-advisor. The other committee member may be a CS-affiliated faculty member. Both must be Northwestern University [Graduate Faculty](#).
- Plan B (Project): A CS faculty member must either be the primary advisor or an equal co-advisor. The other committee member may be CS, a CS-affiliated faculty member, a CS Post-Doctoral Associate, or CS teaching faculty. If the second committee member is not graduate faculty, then contact the DGS-MS about serving as a third member.
- Plan C (Course-only): The committee is the DGS-MS (chair) and DGS-PhD (co-chair).

Use the Graduate Student Tracking System (GSTS) to record your committee and send formal invitations. Acceptance of those invitations is required.

<https://www.tgs.northwestern.edu/academic-policies-procedures/graduate-student-tracking-system-gsts.html>

We encourage MS students to form their committees as soon as they have established clear goals for their research topic. With more time for your committee to help, an MS student can gain lasting connections to industry and research communities, get more guidance on good habits in research, design, writing and publications, and establish broader collaborations through conferences, journals, scholarships, and employment opportunities.

3.4 Timelines

An MS student can complete the program in three quarters, taking four courses per quarter. Most MS students take three courses in one or more quarters, and complete the program in four quarters, typically Fall, Winter, Spring, and Fall. Students may need one or two additional quarters, because they are doing Plan A, Plan B, or the internship, or because of a requirement to take one or more preparatory courses not carrying graduate credit.

International students needing additional time must request an I-20 extension through the Office of International Students and Scholars (OISS):

<https://www.northwestern.edu/international/student-visas/changes-in-visa-status/extending-visa-status.html>

International students on Plan A or Plan B who need an extension for research must first submit an Extension Request form, signed by the research advisor, to the CS Graduate Affairs Coordinator. We need this to approve the request sent by OISS. The form is available on the Forms and Documents page:

<https://www.mccormick.northwestern.edu/computer-science/resources/student/ms.html>

Extensions for international students are limited to two quarters. A student doing Plan A or Plan B with the internship option is still limited to two additional quarters.

A full-time student may declare their degree plan (Section 3.2) early but must declare no later than a month before the end of their 3rd quarter. This would be May 1st for students entering in Fall. A student who does not meet this deadline and does not successfully petition the CS Department for an extension, will be automatically required to do Plan C (course-only).

Students doing the internship option ([Section 3.4](#)) must declare this before the internship begins.

Plan A (Thesis) and Plan B (Project) students should allow ample time for thesis revisions your committee or advisor may require. The Registrar's academic calendar lists master's degree completion deadlines for each quarter

<https://www.registrar.northwestern.edu/calendars/academic-calendars/>

These deadlines vary. In Spring term, the Graduate School requires all thesis defenses and advisor/committee approvals be completed ONE MONTH before the quarter ends. Deadlines in other quarters are not as early but be ready!

Courtesy reminders are sent in advance of the deadlines for each quarter, so please read and complete the necessary requirements.

For details on the degree completion process, see [Section 6](#).

4 Curricular Requirements

MS students typically maintain full-time study (three or four courses) throughout their Computer Science degree programs.

<https://www.tgs.northwestern.edu/academic-policies-procedures/policies/general-registration-policies.html#fulltime>

MS students interested in part-time study (one or two courses a quarter) must discuss and receive approval from the DGS-MS.

<https://www.tgs.northwestern.edu/academic-policies-procedures/policies/general-registration-policies.html#parttime>

For international MS students, part-time study may be permissible under certain circumstances including students who are in the final quarter of their program. See [Section 7.3](#) for details.

4.1 Course Requirements

Twelve (12) units of graduate-level credits with letter grades, i.e., not P/N or S/U, satisfying the following constraints.

- At least six (6) COMP_SCI classes.
 - COMP_SCI 499 (independent study) and COMP_SCI 590 do not count as classes in this sense.
 - COMP_SCI 401 (Introduction to Graduate Studies) is not open to MS students.
- At most six (6) 12 units that are not COMP_SCI classes.
 - All independent study and research credits fall under this category.
 - Class from outside CS must be approved in advance by the DGS-MS.
- At least three (3) of the 12 units of credit must be at the 400-level or above.
 - COMP_SCI 499 satisfies this 400-level requirement, but not COMP_SCI 590.
 - Approved 400-level classes from other departments satisfy this requirement.
- At most three (3) credits of COMP_SCI 499.
- At most
 - Plan A (Thesis): three (3) credits of COMP_SCI 590
 - Plan B (Project): two (2) credits of COMP_SCI 590
 - Plan C (Course-only): zero (0) credits of COMP_SCI 590
- **No repeated courses except:** COMP_SCI 415 (Design, Technology, and Research), COMP_SCI 499, COMP_SCI 590, TGS 512
 - CS 396/496/397/497 are "umbrella" numbers that include many different courses. They can be repeated as long the class content is different.

All coursework for the MS degree must be taken within The Graduate School (TGS) of Northwestern University, i.e., in Caesar, Career = The Graduate School.

Coursework must be completed with a composite grade-point average of B (3.0) or higher.

MS students should consult with their academic advisor before enrolling in courses. Advising helps students avoid bad choices such as inapplicable or inappropriate courses, and courses that do not meet degree requirements.

Courses completed for undergraduate credit at Northwestern cannot be repeated for graduate credit.

4.2 General Registration Courses

An MS student on Plan A or B who has completed all course requirements but needs additional time to finish a project or thesis may register for TGS 512.

<https://www.tgs.northwestern.edu/about/policies/general-registration-policies.html>

A student registered in TGS 512 maintains student visa status, defers student loans, keeps their NetID, WildCards, and email accounts active, and retains access to most university facilities.

Students taking TGS 512 cannot enroll in any courses. They must make steady progress towards degree completion in collaboration with their advisor.

The tuition for TGS 512 is \$100 per quarter. Students taking TGS 512 are not eligible for the TGS Activity Fee nor any of its attendant services.

Students taking TGS 512 are required to maintain their health insurance but do not receive the subsidy.

<https://www.northwestern.edu/student-insurance/students/the-graduate-school-students.html>

Enrollment in TGS 512 requires formal approval from your academic advisor and the DGS-MS.

4.3 Course Credit Waivers

The Graduate School does not recognize transfer credits, but a CS MS student may petition to have the requirement for up to three courses waived, based on graduate courses taken previously at another program. Only coursework that has **not** been applied to satisfy the requirements for a previous degree will be considered. A petition for such a waiver must include documentation (e.g., syllabus, assignments, projects) on the content of each graduate level course, and a transcript that shows the grade received for each course. Waivers can be requested after the first quarter is completed.

All such waivers require the approval of the DGS-MS and DGS-PhD.

5 Prerequisites

All MS Students in Computer Science (including BS/MS and BA/MS students) must provide evidence of having sufficient background in the field.

5.1 Northwestern BS/MS, BA/MS, and transfer students

- Must have completed the undergraduate CS core sequence (COMP_SCI 111 or 150, COMP_SCI 211, COMP_SCI 212, COMP_SCI 213, COMP_SCI 214) prior to beginning their Master's studies.
- Students who have not completed the core sequence will not be allowed to matriculate into the MS program in CS.
- A course taken at another university can substitute for a core class, only if it is accepted as transfer credit towards an undergraduate degree program at Northwestern University.

5.2 MS students newly admitted to Northwestern:

Prior to their first quarter of study, incoming MS students in Computer Science must take **the CS preliminary exam**. The preliminary exam is offered in written form the week before *New Graduate Student Fall Registration* begins. It is the responsibility of the students to arrive on campus in time to take this exam.

The preliminary exam option is only available to newly admitted students. It is not an option for BS/MS, BA/MS, or transfers.

6 Degree Completion

6.1 Degree Completion Process

To complete the MS degree, in their final quarter all MS students must complete the steps

provided in the Checklist for Completing a Master of Science Degree.

<https://www.mccormick.northwestern.edu/computer-science/resources/student/ms.html>

All items on the checklist must be completed by the Master's degree completion deadline stated in the Academic Calendar.

<https://www.registrar.northwestern.edu/calendars/academic-calendars/>

For BS/MS students, all courses used for both the undergraduate degree and master's degree must be accurately listed in the McCormick Advising System (MAS).

For BA/MS students, notify the Registrar's Office Degree Auditing (RODA) which courses should be excluded from your undergraduate degree.

MAS and RODA records must be updated by the Master's degree completion deadline outlined in the Academic Calendar. Please coordinate and plan with your undergraduate advisor ahead of time and stay in touch with them to ensure timely updates to your records in these systems. This will ensure that you have met all course requirements, your record is accurately reflected for both degrees and that any possible issues are caught in advance of the degree deadline.

<https://www.registrar.northwestern.edu/calendars/academic-calendars/>

If the deadlines are not met, the degree cannot be awarded.

On rare occasions, students who have completed all degree requirements but missed the previous quarter's deadline are expected to file an AFD for the following quarter. In such cases, students are not required to register for the current quarter.

Deadlines for Spring quarter are quite early. For Spring quarter only and for students completing a thesis or project, if additional time is needed, please contact the Graduate Program Coordinator no later than one month prior to the Spring quarter Master's degree completion deadline. The program can advise of a minimal extended deadline and conditionally grant department approval for the degree until the thesis and project is successfully completed.

Additionally, prior to the awarding of a degree, such a student can request a Certificate of Completion if one is needed for some purpose, such as employment.

<https://www.tgs.northwestern.edu/academic-policies-procedures/policies/graduation-and-diploma-mailing.html>

6.2 Thesis Defense and Submission

A student doing an MS thesis must successfully present an oral defense of that thesis.

After the advisor and the committee have approved the thesis with any required revisions, the student submits the final approved dissertation as a CS Department Technical Report. The thesis is not considered complete until this step has been taken. Instructions for uploading technical reports can be found here:

<https://www.mccormick.northwestern.edu/computer-science/research/tech-reports/>

When the dissertation has been uploaded, send the link to the PDF to ms-student-help@cs.northwestern.edu.

The MS thesis must conform to the formatting guidelines of a doctoral thesis, as specified by

The Graduate School:

<https://www.tgs.northwestern.edu/about/policies/phd-degree-requirements.html>

There is no specified minimum or maximum length for a thesis. Historically, they tend to be roughly 30 to 50 pages in the double-spaced graduate school thesis format. The MS thesis committee evaluates the thesis contents for completeness and decides if the submitted work is of adequate length.

These steps must be completed by the degree deadline for the quarter. See [Section 6.1](#).

6.3 Project Report Approval and Submission

A student doing an MS project must successfully complete a written project report.

Optionally, the student may submit their project report as a CS technical report.

<https://www.mccormick.northwestern.edu/computer-science/research/tech-reports/>

We recommend, but do not require, that the written project report conforms to the formatting guidelines of a doctoral thesis, as specified by The Graduate School:

<https://www.tgs.northwestern.edu/about/policies/phd-degree-requirements.html>

There is no specified minimum or maximum length for a project report. The typical length is 20 to 40 pages. The MS project committee evaluates the thesis contents for completeness and decides if the submitted work is of adequate length.

These steps must be completed by the degree deadline for the quarter. See [Section 6.1](#).

7 Special Situations

7.1 Transfer

Our MS program has limited capacity. We cannot accept most requests to transfer into CS from other MS programs at Northwestern.

Any petition to transfer into the MS degree program in CS must be approved by both the Director of Graduate Studies for the student's current degree program and the DGS-MS. The student will need a strong recommendation from the current advisor, and we will confer with this advisor during the evaluation of the request.

Transfer is not guaranteed. If approved, **transfers may require one or more additional quarters of study**, and we will require evidence of good progress already made in the original degree program as we consider the transfer request.

Transfer requests are accepted for review after the student has demonstrated success as evidenced by **at least one quarter of letter-graded work** in the current degree program and, at the earliest, transfer requests may be placed in the 2nd (typically Winter) quarter - to be effective starting in the 3rd (typically Spring) quarter of their first year.

A student should request a program transfer no later than the date by which the students declare their degree plan: May 1 of the academic year of their admission, at the latest. In exceptional cases, requests for transfers will be considered after this date, however, they will be subject to extra review.

Students will not be considered for transfer until after they complete at least one quarter of letter-graded work in the program to which they were admitted.

Requests for program transfer should be signed by the students' academic advisor and submitted to the CS Graduate Student Affairs Office (ms-student-help@cs.northwestern.edu). It will be forwarded to the DGS-MS for evaluation. The DGS-MS will take various factors into account, including, but are not limited to:

- Success in the original program of study or track to which the student was admitted.
- The expected ability of the student to successfully complete graduate work in the desired program of study or track. Relevant evidence includes transcripts and work experience.
- The justification provided by the student for requesting a transfer. This justification must be more substantial than a simple desire to change the title of the degree.

7.2 Ad-Hoc Combined MS / PhD Degree

The Graduate School allows students in one PhD degree program to pursue a secondary MS in another program. The details are given here:

<https://www.tgs.northwestern.edu/academic-policies-procedures/policies/ad-hoc-combined-degrees.html>

Note that this must be applied for and approved by both departments in advance. Students applying to the CS MS must provide evidence that they have had course experience comparable to the classes listed in [Section 5.1](#).

7.3 Part-time Enrollment

International MS students should maintain full-time study throughout their Computer Science degree program, as defined by The Graduate School.

<https://www.tgs.northwestern.edu/academic-policies-procedures/policies/general-registration-policies.html#fulltime>

Under certain circumstances, some international students may receive approval from OISS to enroll part-time in a reduced course load.

If a situation arises requiring dropping to part-time study, students on visas should refer to:

<https://www.northwestern.edu/international/international-students/about-student-visas/visa-compliance-and-requirements/>

Students not on visas should email their request and reasons to the DGS-MS.

7.4 Continuation to PhD

Students admitted to the MS degree programs in CS at Northwestern generally cannot enter the PhD programs in CS. The surest, most sensible path for entry into the PhD program is to apply to the PhD program itself rather than entering through the MS program. However, sometimes a faculty member may decide to formally invite a successful MS student to transfer into the PhD program. The faculty member must notify the DGS-PhD of this invitation before the CS department will consider a student's petition to transfer.

MS students are required to complete at least 2 quarters of classes in the MS-only program

before they can be considered for a transfer into the PhD program. A student who is planning to apply to continue with the PhD program must contact the CS Department Student Affairs Office (phd-student-help@cs.northwestern.edu) to learn the correct process for this unusual transfer. Each student's case will be evaluated subject to the same procedures and standards that apply to external PhD applicants, but MS-to-PhD transfer students are ineligible for the first-year fellowships that ordinarily support new PhD students.

7.5 MS in Primary PhD

We recommend that students admitted to the primary Computer Science PhD and Computer Science and Learning Sciences PhD programs apply for an MS degree as soon as they have fulfilled

- the course requirements for Plan C, OR
- the course requirements for Plan B and had their research work approved by a committee designated in GSTS, OR
- the course requirements, and successfully defended their research work before a committee designated in GSTS for Plan A.

For details on the requirements for a CS MS, see [Section 4.1](#). Application for the MS in Primary PhD is done in GSTS.

<https://www.tgs.northwestern.edu/academic-policies-procedures/policies/masters-degree-requirements.html#masterscompletion>

7.6 Academic Integrity

All students are expected to conduct their studies and research following the highest standards for academic integrity.

<https://www.tgs.northwestern.edu/academic-policies-procedures/policies/academic-integrity.html>

Students must be particularly vigilant in programming courses. Unless the instructor for the course has explicitly documented otherwise in the course syllabus:

- Code you submit must be your own.
- Copying and adapting someone else's code is not allowed.
- Studying someone else's solution for a specific assigned problem is not allowed.
- This includes code from a friend, an online article, or online code repository.
- Letting another student study your solution is not allowed.

If an instructor concludes that cheating has occurred, he or she will submit the evidence to your dean for adjudication. Penalties for cheating will depend on the specifics of the case. They can range from loss of points on the assignment in question, a reduction in letter grade for the course, or even failure, in extreme circumstances.

8 Internships, CPT, and OPT

MS students who wish to pursue opportunities for off-campus internships, service-learning projects, and engineering research projects can obtain assistance from the Engineering Career Development program within McCormick School of Engineering:

<https://www.mccormick.northwestern.edu/career-development/for-students/>

An MS student engaged in these activities can maintain full-time registration by enrolling in one of the following courses (requires advisor approval):

- CRDV_411 Engineering Internship Program
- CRDV_412 Projects in Service Learning
- CRDV_413 Engineering Research Project

These zero-unit (0) courses carry **no tuition cost but maintain full-time enrollment status** at the University during these approved activities. They allow only the S/U grade basis (Satisfactory/Unsatisfactory) grade basis. Full-time status is usually required for international students to maintain US visa status and for some scholarships. Registration in CRDV courses helps Northwestern administration, including TGS, record graduate student progress and track our students’ efforts in external research collaborations.

International students who chose to take an off-campus internship must also apply and obtain Curricular Practical Training (CPT) authorization. “Off-campus” is defined as any internship that takes place outside of Northwestern University. For more information on CPT and post-academic work under the Optional Practical Training program, see the International Office website:

<https://www.northwestern.edu/international/living-working/student-employment/index.html>

Requests for approval for CPT go through the McCormick Career Development Office. For information, see

<https://www.mccormick.northwestern.edu/career-development/for-students/getting-started/international-students.html>

For information on OPT, see

<https://www.northwestern.edu/international/international-students/student-employment/opt-f1-students/>

Requests for approval for OPT should be sent to the DGS-MS.

9 Learning Objectives

The goal of the MS in Computer Science is to prepare students for careers in software development and computer science research, by providing academic experiences for a richer understanding of theoretical frameworks, practical experience in applying those ideas to real world problems, and/or research experience in exploring new ideas in computer science.

Learning objectives <i>Students should be able to...</i>	Milestone/ Requirement/ Capacity	Assessment Strategies and Criteria <i>How do we know this objective has been achieved?</i> <i>What criteria do we have to measure success?</i>
Work within a team to develop software-based solutions to complex real-world problems.	Software development courses, team project courses	Successful participation in multiple application development experiences team-based project courses.

Articulate, evaluate, and select appropriate algorithms, data structures, and software frameworks for addressing real-world challenges.	CS graduate-level lecture and reading courses	Successful completion of at least six intermediate and advanced courses in computer science research (machine learning, systems, theory of computing, human-computer interaction, ...), at least 3 400-level classes.
Plan, execute, and document an independent development project.	Project-track	Successful completion of a two to three quarter independent project and committee approval of a project report.
Plan, execute, document, and defend an independent research project.	Thesis-track	Successful completion of a two to three quarter independent thesis project and committee approval of an oral defense and thesis dissertation.
Apply CS concepts to solve problems in other domains of science, engineering, medicine, law, etc.	Non-CS graduate-level electives	Successful completion of up to six courses and projects taught or advised by faculty in science, engineering, medicine, law, and elsewhere.

10 Probation, Exclusion, and Appeal Processes

The Graduate School (TGS) may place a graduate student on probation for failure to meet academic integrity standards (*e.g.*, cheating on coursework), failure to meet all the requirements for academic progress (*e.g.*, maintaining a minimum of 3.0 GPA), or for failure to reach milestones related to project or thesis work. Students placed on probation by TGS receive an email or letter to formally notify them of probationary status, the reason for that status, the actions the student must take to leave probationary status, and specific deadline dates for those actions.

Despite its dire implications, probation is meant to be a strong motivation rather than a punitive action. It is a formal, top-priority alert that you must take immediate corrective actions to continue in your degree program. Most probation notices allow a student only one or two quarters to resolve the problem before dismissal, but a student may formally petition TGS for an extension by supplying suitable and convincing reasons. Failure to remove probationary status before the deadlines given may ultimately result in exclusion from The Graduate School and the respective degree program.

Once a MS student is placed on probation, the CS department reserves the right to review the student's case and subject the student to additional requirements and penalties during probation as relates to their standing in the CS degree program including, but not limited to, loss of funding and/or exclusion from the CS graduate program. For more information on probation and appeal processes for probation, please refer to The Graduate School requirements for satisfactory academic progress:

<https://www.tgs.northwestern.edu/academic-policies-procedures/policies/satisfactory-academic-progress.html>

11 Conflict Resolution

Conflicts between MS students and faculty or the department are exceedingly rare. If one occurs, and good faith efforts to resolve informally are unsuccessful, please see the following for the formal processes for documenting and resolving conflicts.

<https://www.tgs.northwestern.edu/services-support/dealing-with-student-faculty-conflicts/index.html>