

MASTER'S DEGREE GUIDELINES

MS DEGREES OPTIONS

There are two Master's degree programs within the School of Computing (SoC) at the University of Utah:

- MS in Computer Science
- MS in Computing

Degree programs may contain a thesis, a project, or a course-only option as specified. Transfers between degree programs will be considered between semesters and will occur only once per academic year.

An MS in Computing is earned within a particular track. Students are, in part, admitted based upon the track that they have selected during the admissions process. If students wish to switch tracks, they should seek approval from DGS and from the track director of the track to which they wish to enter.

The Program of Study form must be submitted to the Graduate Records Office by the Graduate Advisor no later than the last day of the semester proceeding the semester of graduation.

The Director of Graduate Studies (DGS) is the responsible entity for all graduate degree related issues. He/she will act in consultation with the track directors for administration of the Computer Science program, and Computing Degree programs. In the information that follows: statements indicating that something will be done/approved by DGS should be understood to mean "DGS and/or the track directors".

REGISTRATION REQUIREMENTS

Full-time graduate students in the School of Computing are required to register for 9 hours, which includes regular courses, seminars, and research credits as appropriate. This is especially the case for students being supported via research or teaching assistantships. Students who are not being supported by the school are required to take nine hours to be classified as full-time by the graduate school.

Graduate School policy dictates that a graduate student who receives a full tuition waiver during any semester in which he or she holds an assistantship, fellowship, or traineeship, is required to register for at least nine semester hours, including thesis research and seminars. Students must be registered for at least three hours per semester, exclusive of summer semester, to remain in a graduate degree program. Students who do not maintain continuous registration and who have not been granted a leave of absence by the Graduate School are subject to being discharged from their degree program.

Students choosing the thesis option must be registered for at least three semester hours during the semester of their thesis defense. Once a student has passed the thesis defense, the student does not have to register the next term, and the student needs to turn in the final thesis draft to the thesis office within 90 days.

COURSE REQUIREMENTS

All degree programs have certain course requirements. To graduate, this coursework must appear on a student's approved program of study, a customized course plan developed by the student in conjunction with their committee.

Courses that count toward graduation must be on the program of study. The following default restrictions apply to these courses:

- CS courses must have a course number of 6000 or above (CS 5470: Compiler Principles and Techniques will also be allowed)
- Non-CS courses must be a graduate level course having a course number of 5000 or above, and should

Master's Degrees:

MS in Computer Science

MS in Computing

Tracks:

- Computer Engineering
- Data Management and Analysis
- Graphics and Visualization
- Image Analysis
- Networked Systems
- Robotics
- Scientific Computing

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- be directly related to the student's degree
- A grade of C or better
- The GPA over all courses in the program of study must be at least 3.0

In the subsequent pages of this document, each degree program and/or track may specify modifications and/or additions to these restrictions. Students should also consult the Graduate School Handbook concerning any university requirements.

A student may register for CS 6020 if that student writes and publishes a peer-reviewed article based on research performed in the School of Computing at the University of Utah. The contribution of the student to the article should be equivalent to that conferred by first authorship. The paper should be published in a respectable outlet. It is the responsibility of the student's advisor to determine whether the student has made such a contribution, and whether the outlet is of sufficient quality. This paper must be accepted for publication prior to the end of the second year of study.

COURSE WAIVERS

A student may obtain a waiver for any of the required courses by demonstrating prior knowledge (e.g., successful completion of a similar course taken at another recognized University). This waiver is obtained by petitioning the DGS. The waiver procedure should be initiated by first contacting the Graduate Advisor. Waiving a required course does not reduce the 30 graduate credit-hour requirement.

MS SUPERVISORY COMMITTEE

The MS Supervisory Committee (SVC) consists of three members. The following two policies are in place for SVCs:

1. The chair of an SVC must be a regular faculty member (tenured/tenure track) from the SoC.
2. The majority of the SVC must be regular faculty members (tenured/tenure track) within the SoC.

Research or adjunct faculty may chair or may be members of supervisory committees if accorded that privilege by the SoC faculty and the Graduate School. However, exception to only one of the two policies listed above but not both simultaneously will be allowed.

MS COMPREHENSIVE EXAM

For the project and thesis options of this degree, the MS comprehensive exam will be administered by the student's supervisory committee and can be coupled with (i.e., satisfied by) a project or thesis proposal defense, and/or meeting a specified level of performance on a set of classes.

For students not opting for a project or thesis, the comprehensive exam will typically be passed by meeting the grade requirements in the courses required for completing their degree/track, but this can be modified at the discretion of the student's committee.

MS TRANSFER CREDIT

A student may only count up to nine semester hours of non-matriculated graduate work at the University of Utah toward any graduate degree unless the student's registration for more than nine semester hours is specifically approved in advance by the SoC Director and the Dean of the Graduate School. Graduate courses taken as an undergraduate at the University of Utah cannot be counted towards a degree program unless a petition for graduate credit was filed with the University's Registrar at the time the course was taken.

Students who have done graduate study at other recognized institutions may transfer up to six semester hours to the University of Utah. The courses must be bona fide graduate-level classwork (e.g., independent study is excluded), with grade C or better. Students must be able to show that the course work was not used toward any other degree.

Approval of each course is granted by the student's supervisory committee and the DGS. Course appropriateness is determined by consideration of course content and the student's declared research area. Approved courses are certified by

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a transfer credit form. Approval of a course taken elsewhere for transfer credit does not necessarily imply fulfillment of any specific required course.

MS PROJECT DOCUMENT (Project Option)

The project is done through an independent study (often formally as an independent study course) with a professor in the School of Computing. The parameters for the scope of the project is set forth at the onset of the independent study, and the defense of the project will be done before the student's entire committee plus the professor in charge of the independent study (normally with the chairperson of the committee being the professor with whom the independent study is done). The student is responsible for arranging a time and place for the defense together with the committee.

MS THESIS DEFENSE AND THESIS DOCUMENT (Thesis Option)

The supervisory committee must give preliminary approval of the thesis prior to the defense. The defense can be scheduled after this approval. To schedule the defense, contact the Graduate Advisor at least two weeks prior to the defense date agreed upon by the supervisory committee. A verification notice will be sent to all committee members asking if the student is ready to defend. Once positive responses are received, and no later than one week prior to defense, the defense will be announced to all students and faculty in the School of Computing. Students are strongly encouraged to schedule the defense during a regular colloquium slot.

The student must provide one copy of the thesis to the chair of the supervisory committee at least three weeks before the defense, and one copy to each of the other committee members at least two weeks prior to the defense. A complete draft of the thesis must be emailed as a PDF to the Graduate Advisor two weeks prior to the announced time of defense. This copy will be made available for department access.

After successfully defending the thesis, the student must obtain approval that the thesis is satisfactory by obtaining signatures from their committee members and the chair of the department by using the Final Reading Approval form, and the Supervisory Committee Approval form. These forms will be submitted along with the final draft of the thesis manuscript to the thesis office. The majority of the signatures of the committee members are required for the thesis editors to start the format approval and the editing process. A student can defend a thesis until the day before the following semester starts. However, in order to graduate in a certain semester, please consult the thesis calendar for submission deadlines on the Graduate School's website.

Students should also read the document regarding copyright notices provided by the School and declare their intentions regarding granting the School the right to photocopy the thesis before notifying the Graduate Advisor of completion of the defense.

The student has one month after the defense to make any revisions prior to submitting the thesis to the Graduate School Thesis Editor. There will be at most two additional months to complete any changes required by the Thesis Editor before final acceptance. If either of these deadlines are not met, the candidate must redo the oral defense. The final thesis must be filed one week before the end of the semester of graduation.

Students are expected to offer each committee member a bound copy of the thesis once it is completed, and one to the School of Computing library. Detailed policies and procedures concerning the thesis are contained in "A Handbook for Theses and Dissertations" published by the Graduate School.

RESIDENCY

At least 24 hours of the 30 MS course and thesis hours must be in resident study at the University of Utah. This does not refer to, or fulfill, State Residency Requirements. A full time student working on an MS program is expected to complete the degree requirements within two calendar years. The Graduate School limits MS programs to four years.

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LEAVE OF ABSENCE

If a student does not plan to take classes during a Fall or Spring semester, a leave of absence must be requested. Contact the Graduate Advisor for the proper form.

MONITORING OF PROGRESS

Annual meetings and reports: Each year the student will meet with the track director for review of their progress.

Actions by the DGS and the School: In the event that a student is found not to be in good standing (a decision made by the DGS based on reports from the advisory committee) one or more actions may be taken. For example, the School may assign the DGS to counsel the student, deny opportunities to serve as departmentally funded TA, discontinue tuition waiver benefits, or remove the student from the program. In the event that a faculty member fails to meet with advisory committees and report on their students, the DGS may elect to disallow this faculty to advise new students.

GRADUATE STUDENT PROGRESS GUIDELINES FOR THE MS THESIS PROGRAM

| Milestone | Good Progress | Acceptable Progress | Comments |
|---------------------------|---------------|---------------------|---|
| Choose advisor | 1 Semester | 2 Semesters | |
| Full committee formed | 2 Semesters | 3 Semesters | |
| Program of study | 2 Semesters | 3 Semesters | |
| Complete required courses | 3 Semesters | 4 Semesters | Program requirement: within three semesters |
| Defend proposal | 3 Semesters | 4 Semesters | U. requirement: one semester before defense |
| Thesis defense | 4 Semesters | 5 Semesters | |
| Final document | | | U. requirement: document finalized within three months of the defense |

MS IN COMPUTING: GRAPHICS & VISUALIZATION

A student may pursue an MS with (1) a course-only option, (2) a project option, or (3) a thesis option. The minimum number of credits for any option is 31 with 30 from graduate level (6000 level for CS courses) and 1 hour of either CS 7942 Visualization Seminar or CS 7933 Graphics Seminar. Seminars may not replace required or elective courses.

TRACK FACULTY

Martin Berzins, Elaine Cohen, Charles Hansen, Chris Johnson, Ladislav Kavan, Mike Kirby, Alexander Lex, Miriah Meyer, Valerio Pascucci, Bei Wang Phillips, Bill Thompson, **Cem Yuksel (track director)**

| COURSE REQUIREMENTS (COURSE ONLY OPTION) Four of the following regular courses are required in addition to the seminar. | |
|--|-----------------------------------|
| CS 6610 | Interactive Computer Graphics |
| CS 6630 | Visualization for Data Science |
| CS 6635 | Visualization for Scientific Data |
| CS 6640 | Image Processing |
| CS 6670 | Computer-Aided Geometric Design |
| CS 7933 Graphics Seminar (or) CS 7942 Visualization Seminar (one credit hour maximum) | |
| A minimum of a B- or greater is required for any of the required courses. | |

| Three courses from the following list are required: | |
|--|------------------------------------|
| CS 6160 | Computational Geometry |
| CS 6170 | Computational Topology |
| CS 6320 | 3D Computer Vision |
| CS 6360 | Virtual Reality |
| CS 6540 | Human/ Computer Interaction |
| CS 6600 | Mathematics of Computer Graphics |
| CS 6620 | Ray Tracing for Graphics |
| CS 6650 | Perception for Graphics |
| CS 6660 | Physics-based Animation |
| CS 6665 | Character Animation |
| CS 6680 | Computer-Aided Geometric Design II |
| Elective courses (to equal 30 total credit hours): | |
| Graduate level CS courses and independent study (a maximum of three hours of independent study is allowed). Thesis research hours are not counted toward the degree in the course-only option. | |

COURSE-ONLY OPTION

With approval of the supervisory committee, a student may take two elective courses at the graduate level or higher from other departments including 5000 or 6000 level courses, excluding independent study, seminars and research credit.

MS IN COMPUTING: GRAPHICS & VISUALIZATION

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| COURSE REQUIREMENTS | |
| (PROJECT OPTION) Four of the following regular courses are required in addition to the seminar. | |
| CS 6610 | Interactive Computer Graphics |
| CS 6630 | Visualization for Data Science |
| CS 6635 | Visualization for Scientific Data |
| CS 6640 | Image Processing |
| CS 6670 | Computer-Aided Geometric Design |
| CS 7933 Graphics Seminar (or) CS 7942 Visualization Seminar (one credit hour maximum) | |
| A minimum of a B- or greater is required for any of the required courses. | |

| | |
|--|------------------------------------|
| Three courses from the following list are required: | |
| CS 6160 | Computational Geometry |
| CS 6170 | Computational Topology |
| CS 6320 | 3D Computer Vision |
| CS 6360 | Virtual Reality |
| CS 6540 | Human/ Computer Interaction |
| CS 6600 | Mathematics of Computer Graphics |
| CS 6620 | Ray Tracing for Graphics |
| CS 6650 | Perception for Graphics |
| CS 6660 | Physics-based Animation |
| CS 6665 | Character Animation |
| CS 6680 | Computer-Aided Geometric Design II |
| Elective courses (to equal 30 total credit hours): | |
| Students must take at least 3 and up to 6 credits (no more than 6 credits) of independent study for their MS project. Thesis research hours are not counted toward the degree in the project option. | |

PROJECT OPTION

With approval of the supervisory committee, a student may take two elective courses at the graduate level or higher from other departments including 5000 or 6000 level courses, excluding independent study, seminars, research credit.

MS IN COMPUTING: GRAPHICS & VISUALIZATION

| COURSE REQUIREMENTS | |
|---|-----------------------------------|
| (THESIS OPTION) | |
| Minimum 21 hours classroom courses and six hours of thesis research are required. Three of the following regular courses are required in addition to the seminar: | |
| CS 6610 | Interactive Computer Graphics |
| CS 6630 | Visualization for Data Science |
| CS 6635 | Visualization for Scientific Data |
| CS 6640 | Image Processing |
| CS 6670 | Computer-Aided Geometric Design |
| CS 7933 Graphics Seminar (or) CS 7942 Visualization Seminar (one credit hour maximum) | |
| A minimum of a B- or greater is required for any of the required courses. | |

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|---|------------------------------------|
| Three courses from the following list are required: | |
| CS 6160 | Computational Geometry |
| CS 6170 | Computational Topology |
| CS 6320 | 3D Computer Vision |
| CS 6360 | Virtual Reality |
| CS 6540 | Human/ Computer Interaction |
| CS 6600 | Mathematics of Computer Graphics |
| CS 6620 | Ray Tracing for Graphics |
| CS 6650 | Perception for Graphics |
| CS 6660 | Physics-based Animation |
| CS 6665 | Character Animation |
| CS 6680 | Computer-Aided Geometric Design II |
| Elective courses (to equal 30 total credit hours): | |
| For the thesis option, students can take up to 9 thesis hours and no independent study. | |
| A minimum of six hours of thesis research (CS 6970) is required. | |

THESIS OPTION

With approval of the supervisory committee, a student may take two elective courses at the graduate level or higher from other departments including 5000 or 6000 level courses, excluding independent study, seminars, research credit.