Master of Science in Cybersecurity Program Rules and Procedures
Michigan Technological University

Table of Contents

1   Introduction

The purpose of this handbook is to provide students pursuing the MS in Cybersecurity with an overview of the rules governing this program. Students should also familiarize themselves with the degree requirements set forth by the Graduate School. The requirements set by the Graduate School supersede any policies contained in this handbook. The Graduate School requirements are given at https://www.mtu.edu/gradschool/policies-procedures/requirements/. Note that the rules and procedures contained in this handbook are subject to change. Please see the Director of Computer Science Graduate Programs for updates.

2   Policies and Procedures

2.1   Admission Requirements

Applicants should have a BS in computer science, computer engineering, computer and network system administration or a related field. Exceptions may be made for well-qualified applicants from other disciplines.

All applicants, except for Michigan Tech graduates, are strongly encouraged to submit GRE test scores. The program anticipates scores of 70% quantitative, 3.0 analytical writing and 50% verbal from successful applicants. There is no minimum GRE score that is required for admission. A TOEFL score at least 79 (IBT) or 6.5 (IELTS) is required for international applicants whose native language is not English. Successful applicants typically have an undergraduate GPA of 3.2 or better on a 4.0 point scale.

2.2   Choosing an Advisor

Each student will have an advisor that has a tenured/tenure-track appointment in the Department of Computer Science, the Department of Electrical and Computer Engineering, or the Department of Applied Computing. All students will be advised by the Department of Computer Science Graduate Program Director until they choose an advisor. Coursework option students may retain the Graduate Program Director as their advisor through graduation.

Students in the thesis and report options will have an advisory committee consisting of the student's advisor and at least two additional members. At least one member of the advisory committee must have a tenured/tenure-track appointment in the Department of Computer Science.

All advisory committee members must be members of Michigan Tech's Graduate Faculty. The advisory committee members will be selected by the advisor in consultation with the student. An advisor should be chosen during the first year of residence.

2.3   Change of Advisor

Before initiating the process to change your graduate advisor, please consider all the options listed on the Graduate School's website for how to address difficulties in the student-advisor relationship (https://www.mtu.edu/gradschool/resources-for/students/academic/succeeding/index.html).

Once you have decided to change your graduate advisor, you must follow the steps listed below.

1. Meet with your graduate program director to initiate the process to change advisor. If meeting with the graduate program director is not feasible or appropriate, meet with the department chair.

2. Discuss the following with the graduate program director (or Chair) and, if appropriate, the current advisor:

    o Whether additional resources within or outside the department (such as the Ombuds office) could help resolve the situation.

    o The impact of the change of advisor on your time to complete the degree.

    o Your current and future funding.

    o Research already conducted. Whether this will be incorporated into the dissertation, thesis, or report, and if so, how.

    o Impact on immigration status (if any). Consult International Programs and Services (IPS), if necessary.

    o Record the agreement from the discussions in writing, including indications of agreement from all affected faculty advisors, and provide copies to the student, the graduate program director, and all affected faculty advisors.

3. File an updated Advisor and Committee Recommendation Form for approval by the Graduate School (https://www.mtu.edu/gradschool/documents/policies-procedures/forms/advisor-committee.pdf).

4. If the student and the graduate program director are unable to reach agreement on the advisor change, contact the assistant dean of the Graduate School to determine additional steps to resolve the situation.

2.4   Course Work Requirements

All students must satisfy a core and a specialization requirement.

The core requirement is satisfied by successful completion of the four courses listed below.

Core Courses:

- CS 4471/5471 Computer Security or SAT 5111 Security and Privacy

- CS 4001/5001 National Cybersecurity Policy and Law

- EE 4723 Network Security

- MA 3203 Cryptography or CS 5350 Modern Cryptography

Students complete the specialization requirement by taking at least three of the courses listed below.

Specialization Courses:

- CS 4710 Model Driven Software Development

- CS 5472 Advanced Topics in Computer Security

- CS 5740 Development of Trusted Software

- CS 5751 Dependable and Secure CPS-IoT

- SAT 5283 Information Governance and Risk Management

- SAT 5520 Machine Learning in Cyber Security

- SAT 5816 Digital Forensics

- SAT 5817 Security Penetration Test and Audit

Equivalent courses taken to fulfill the requirements for an undergraduate degree may be used to fulfill the core and specialization requirements; however, the credits may not be counted toward the MS degree. When a course was not taken at Michigan Tech, a waiver is required. The Michigan Tech faculty member whose expertise is in the area of the non-Michigan Tech course under consideration for the core or specialization requirement, must approve the non-Michigan Tech course. Students wishing to count non-Michigan Tech courses toward the core or specialization requirements must complete the "Cybersecurity Core/Track Requirement Form" that can be obtained from the Computer Science Graduate Secretary.

A total of thirty total hours of coursework must be taken. Courses to complete the remaining nine credits can be chosen from any of the following:

1. the specialization courses,

2. courses at the 4000 or 5000 level in electrical and computer engineering, computer science or system administration technology, and

3. and the special courses CS 5990, CS 5999, EE 5990, EE 5991, EE 5992, EE 5994, SAT 5988 and SAT 5989. CS 5990, EE 5990, EE 5591 and SAT 5989 are only available to students completing the degree under the thesis or project options. The thesis, project and coursework options are described in more detail in section 2.5.

Students should get prior approval from the program director for courses in category [gen].

The following course groupings highlight options for students interested in developing deeper expertise in specific areas of study.

- **Trusted Software**: CS 4710, CS 4711, CS 4740 or CS 5740, CS 5751, SAT 5817

- **Systems Security**: CS 4411, CS 4130, CS 4431, CS 5751, SAT 5816

- **Applied Network Security**: SAT4812, SAT5111, SAT5816, SAT5817, SAT5520, SAT5165

- **Artificial Intelligence**: CS 4811, CS 5831 OR SAT 5165, CS 5481 OR SAT 5520, CS 5472

One grade of BC may be applied toward the degree. Otherwise, courses must be completed with a grade of B or better.

2.4.1 Credit Transfer

A maximum of six course credits taken as a student at other colleges or universities may be accepted for credit towards the MS in Cybersecurity at Michigan Tech. A transferred course cannot have been applied toward any other degree (at Michigan Tech or elsewhere) except under the policies for Michigan Tech's accelerated MS program. If these credits were taken before enrollment at Michigan Tech, a request for transfer credit should be made during the student's first semester on campus.

Transfer credits must be

- approved by a faculty member who teaches an equivalent course at Michigan Tech and by the graduate director, or by the graduate committee and by the student's advisory committee;

- within 10 years of the student's first semester at Tech; and

- completed with a grade of B or better.

2.5 Degree Options

Students may select from among three options for completion of the MS degree: the thesis option, the report option, and the course work option. All three options require 30 hours of course work. The options are described in detail below.

2.5.1 Thesis Option

Under the thesis option, six to nine of the 30 hours of credit required for graduation may be in one of the research courses: CS5990, EE 5990 or SAT 5989. A student must take at least six credits of one of these three courses. Students in the thesis option may take up to three hours of CS 5999, EE 5992, EE 5994 or SAT 5988.

In addition to the coursework, a student following the thesis option is expected to:

1. Prepare a written plan describing the thesis research.

2. Defend the research plan in an oral seminar presentation or meet with the advisory committee to discuss the research plan. The student and her/his advisor will determine whether the plan is to be presented in a department-wide seminar, or will be presented to faculty members individually.

3. Prepare a final thesis.

4. Defend the thesis in an oral seminar presentation.

Oral defenses (research plan and thesis defense) must be announced to the College of Computing faculty and graduate students at least two weeks prior to the defense. The written plan and thesis must also be distributed two weeks in advance of the oral defense. A defense may be cancelled if these requirements are not met. Section 4.1 describes the expected process for scheduling an oral presentation.

The department recommends the following timetable for the milestones along the way to a thesis masters. (Note: items marked with a '+' are milestones; items marked with a '*' are requirements.)

- Find a thesis advisor during the first, or no later than the second, semester in the program.

- Present a thesis plan during the second or third semester in residence (not counting summers).

- Provide a defendable thesis to the entire committee no later than two weeks prior to the thesis defense. Make the thesis available to the College of Computing faculty and graduate students.

- Defend the thesis in a public forum. This includes two question and answer sessions: the first consists of both students and faculty; the second being closed to the general audience consists of faculty only.

2.5.2 Report Option

Under the project option, three to six of the 30 hours of credit required for graduation may be in one of research courses: CS5990, EE 5991 or SAT 5989. A student must take at least

three credits of one of these three courses. Students in the project option may take up to three hours of CS 5999, EE 5992, EE 5994 or SAT 5988.

In addition to completing the required coursework, the student is expected to:

1. Prepare a written project plan which describes any background necessary for completion of the project and a project plan.

2. Present the project plan to the advisory committee.

3. Prepare a final report at the conclusion of the project.

4. Defend the project report in a public oral seminar presentation.

The final oral defense must be announced to the College of Computing faculty and graduate students at least two weeks prior to the defense. The written report must also be distributed two weeks in advance of the oral defense. A defense may be cancelled if these requirements are not met. Section 4.1 describes the expected process for scheduling an oral presentation.

The department recommends the following timetable for the milestones along the way to a report masters. (Note: items marked with a '+' are milestones; items marked with a '*' are requirements.)

- Find a major advisor during the first two semesters in the program.

- Present a project plan to the advisory committee during the 3rd term in residence (not counting summers).

- Provide a "defendable" project report to the entire committee no later than two weeks prior to the oral defense. Make the report available to the CS department faculty and graduate students.

- Defend the report in a public forum. This includes two question and answer sessions: the first consists of both students and faculty; the second being closed to the general audience consists of faculty only.

2.5.3 Course Work Option

The course work option requires 30 hours of graded course work. None of the 30 hours of credit required for graduation may be in CS5990, EE 5990, EE 5991 or SAT 5989. A student in the coursework option may take up to six credits of CS 5999, EE 5992, EE 5994 or SAT 5988.

2.6 Review

All graduate programs at the university provide constructive written feedback to students who are completing a report, thesis, or dissertation, at least annually. Following is the

process for yearly evaluation of students that have chosen the thesis or project options for their MS degree.

Before the start of the fourth week of classes in the Fall semester, each student that has chosen the thesis or report options will complete a yearly progress report for MS Thesis students. (See Appendix A: MS Cybersecurity Student Annual Progress Report) The student will complete the report and submit it to their advisor. The advisor will complete the form and meet with the student to discuss the student's progress. The student will then submit the form to the graduate director by email as a PDF and in hard copy.

If deficiencies are identified in a student's performance, the student will receive written feedback from the graduate committee specifically addressing the area(s) of deficiency, timeline for making up the deficiency, and consequences for continued unsatisfactory performance. From this point, the student must complete the evaluation form each semester of enrollment until there is a satisfactory review.

3   Professional Development

Success in graduate school and in a career depends on factors outside of coursework. The following link identifies a range of resources available to help students succeed in graduate school and beyond. https://www.mtu.edu/gradschool/resources-for/students/professional/.

3.1   Career Counseling

In addition to the resources identified above, it can be helpful to get advice on professional development specific to a career area. Students are encouraged to contact a faculty advisor in their chosen area to help with coursework selection and career advice.

3.2   Individual Development Plan

An Individual Development Plan encourages a student to reflect on career goals and how best to use the resources and time available during graduate study in order to meet those goals. Students pursuing the Report and Thesis options are especially encouraged to complete an Individual Development Plan.

Many IDP forms are available online. Michigan Tech has created the form linked here https://www.mtu.edu/gradschool/resources-for/students/professional/documents/mtu-gs-idp.docx for this purpose. Students are encouraged to use any form they find useful. More information on IDPs is available from the graduate school at: https://www.mtu.edu/gradschool/resources-for/students/professional/idp/.

4   Additional Requirements

4.1   Oral Presentation Scheduling

Following are the steps for scheduling an oral presentation.

1. Reserve a room through the site: https://www.mtu.edu/registrar/students/room-schedule/.

2. Create a Google Calendar invitation including the presentation location, an abstract and a link or copy of the report, proposal, thesis or dissertation. Send the invitation to the Graduate Assistant. Note that the Graduate Assistant should be able to invite others.

3. The Graduate Assistant will distribute the invitation to the College of Computing faculty and graduate students.

4.2   Forms and Deadlines

Forms and Deadlines for the Graduate School are available at: https://www.mtu.edu/gradschool/policies-procedures/forms-deadlines/.

Personalized requirements for each student are maintained at https://mymichigantech.mtu.edu.

Students are responsible for keeping track of form requirements and ensuring the required forms are submitted on time.

Appendix A: MS Cybersecurity Student Annual Progress Report

MS Cybersecurity Student Annual Progress Report

Sep 1 (YEAR) - Aug. 31 (YEAR+1)

Student Name:

Advisor(s):

Semester you entered the MS program:

Degrees attained prior to entry to MS program:

Milestones

Please fill in the dates you have reached, or expect to reach the following milestones. Work with your advisor for the expected dates.

	Planned Completion Date	Actual Completion Date
Witten plan approved		
Oral plan defended (thesis only)		
Written report approved		
Oral defense		

Comments on milestones:

Research Activities

Write a short summary of your research activities. If you have any papers that have been published, accepted or submitted to conferences or journals, list these. Also list other research activities such as software infrastructure development in this section.

Teaching Activities

1. Courses and/or Labs taught since your last performance review <u>(attach student evaluation report for each course):</u>

2. TA positions served since your last performance review. <u>(attach faculty evaluation for each course):</u>

Professional Development/Service Activities

Indicate any service activities you have engaged in. Include service to the department, the profession or the community.   Examples include "gave campus tours on preview day", "participated in a poster session for undergraduates", etc.

Advisor's Comments

In your opinion, the student's progress toward degree in the past year is

_____Satisfactory

_____Needs improvement

_____Unsatisfactory

Please explain your rating and comment on the student's progress toward graduation, and his/her plan for future milestones.

Signatures:

Advisor: _____   Date:_____

Co-advisor: _____   Date:_____

Student: _____   Date:_____