Master of Science in Cybersecurity Program Rules and Procedures

Michigan Technological University

July 24, 2019

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. 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, *must* 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 is both a member of the Michigan Tech graduate faculty and a member of the Computer Science, Electrical and Computer Engineering, or Computer and Network System Administration program tenured/tenure-track faculty.

Students in the thesis or project options will have an advisory committee consisting of the student's advisor and at least two additional members. Students in each track must have at least one committee member from the primary unit associated with the track. Critical Infrastructure Protection track students must have a committee member from the Department of Electrical and Computer Engineering. Network Security Management track students must have a committee member from the Computer and Network System Administration program. Additionally, one of the three members must be from the Department of Computer Science.

All advisory committee members from Michigan Tech 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. Until the advisor is chosen, the student will be advised by the Director of Computer Science Graduate Programs.

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:
    - Whether additional resources within or outside the department (such as the Ombuds office) could help resolve the situation.
    - The impact of the change of advisor on your time to complete the degree.
    - Your current and future funding.
    - Research already conducted. Whether this will be incorporated into the dissertation, thesis, or report, and if so, how.
    - Impact on immigration status (if any). Consult International Programs and Services (IPS), if necessary.
    - 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 track requirement.

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

- CS 4471 Computer Security (or CS 5471 Computer Security)
- CS 5000 National Cybersecurity Policy and Law
- EE 4723 Network Security

- MA 3203 Cryptography

Students complete the track requirement by completing the four courses comprising the selected track. The available tracks and their course requirements are given below.

Track A: Critical Infrastructure Protection

- EE 5500 Probability and Stochastic Processes
- EE 5231 Energy Control Center Applications
- EE 5451 Risk Assessment for Critical Infrastructure Protection
- EE 5455 Cybersecurity for Industrial Control Systems

Track B: Network Security Management

- SAT 5111 Security and Privacy
- SAT 4812 Cyber Security II
- SAT 5281 Healthcare Security Management
- SAT 5816 Digital Forensics

Track C: Trusted Software Engineering

- CS 5472 Advanced Topics in Computer Security
- CS 4710 Model Driven Software Development
- CS 5321 Advanced Algorithms
- CS 5740 Development of Trusted Software

Equivalent courses taken to fulfill the requirements for an undergraduate degree may be used to fulfill the core and track 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 track requirement, must approve the non-Michigan Tech course. Students wishing to count non-Michigan Tech courses toward the core or track 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. Students may choose from the elective courses given in table 1 and CS 5990 to complete the thirty hour credit requirement. CS 5990 is only available to students completing the degree under the thesis or project options. These options are described in more detail in section **??**.

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

At most three credits of CS 5999 may be applied toward the thirty credit hour requirement.

A course not in the approved electives list given in table 1 may be applied toward the degree with prior approval from the Director of Computer Science Graduate Programs.

CS 4711 Software Processes and Management
CS 5461 Mobile Networks
CS 5811 Advanced Artificial Intelligence
CS 5431 Advanced Computer Architecture
CS 5441 Distributed Systems
EE 5511 Information Theory
EE 5497 Multimedia Security
SAT 5211 Medical Application Development and Security
SAT 5231 Statistical Methods for Intrusion Detection
SAT 5241 Designing Security Systems
SAT 5251 Advanced Topics in Network Security
CS 5999 Master's Reading and Research in Computer Science

Table 1: Approved Elective Courses

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. At most one course with a grade of BC may be counted toward the degree. Otherwise a grade of B or better must be attained in all courses.

The options are described in detail below.

2.5.1 Thesis Option

Under the thesis option, the program allows up to 9 of the 30 hours of credit required for graduation to be in CS5990. In addition to completing the 30 hours of credit in approved courses (including CS5990 and up to 3 hours of CS5999 credit though not more than 9 total hours may be taken in CS5990 and CS5999), 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.

The program 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 year in the program.
+ present a thesis plan by the end of the 3rd semester in residence (not counting summers).
* provide a defendable thesis to the entire committee no later than two weeks prior to the thesis defense. In addition, make a copy available in the CS main office for other interested parties.
* 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

The report option allows up to 6 of the 30 hours of credit required for graduation to be in CS5990. In addition to completing the 30 hours of credit in approved courses (including CS5990 and up to 3 hours of CS5999 credit), a student following the report option is expected to: work on a project and present written and oral project reports at the conclusion of the project. Thus, the student should:

1. Prepare a written project plan which describes any background work 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 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 year in the program.
+ present a project plan by the end of 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. In addition, make a copy available in the CS main office for other interested parties.
* 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 and no more than 3 hours of CS5999 credit may be applied to the 30-hour requirement. Course work option students may find an advisor from the CS, ECE, or School of Technology faculty. Otherwise, these students will be advised by the Director of Computer Science Graduate Programs.

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 **??**.) 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.

A MS Cybersecurity Student Annual Review Form

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 (attach student evaluation report for each course):

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

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: _____