Office of the Provost

Change to an Existing Degree Program Form

Proposed Change to an Existing Degree: Academic Components

Please answer all relevant questions below. Consultation with the appropriate Associate Provost on a draft of the proposal is recommended.

Title of Degree (e.g., Bachelor of Arts in History):

Master of Science in Computer Science
Master of Science in Computer Science with a specialization in Cyber Security

1. Please provide the name, title, email address, and phone number of the primary contact person for this academic program:

Mark Crovella, Professor and Chair, crovella@bu.edu, 617-353-8919

2. Please describe briefly the proposed change to the existing degree:

Both MS degrees in Computer Science currently require students to complete a master's research project. We propose to make the research project optional so that students have the option of completing the degree through coursework alone. We are not proposing any changes to any other degree requirements.

3. Please provide a rationale for the proposed change to the existing degree:

The MS degree as originally formulated required some experience in research or independent inquiry. This experience took the form of the master's project or thesis. Incorporating this component was appropriate when the degree was viewed as a stepping stone to a PhD. However as both the field and student interests have evolved, the MS in Computer Science is now seen by both students and faculty as fundamentally a professional degree, and only secondarily as possible preparation for a PhD program. Hence, requiring all students to complete a research-style element in their program is no longer meeting student needs nor is it the best use of a student's or faculty member's time.

Accordingly, we propose to shift MS student's time allocation from research toward additional coursework. To do this, we propose to eliminate the project as a required component of the CS MS degree. Because students almost always use one or more directed studies to complete their projects, this will have the effect of requiring students to take additional classroom-based courses in the process of completing their degree. We believe this will come closer to meeting the vast majority of students' goals in seeking the MS degree. For those students who are considering going on to the PhD, the project or thesis is still a valuable option and will remain part of the program.

We note that many CS 500-level courses include a course semester project, so our masters students will continue to receive significant project experience in earning this degree.

4. Please describe how the proposed change(s) advances the Strategic Plans of the department, of the school/college, and of the University:

A goal of the Computer Science Strategic Plan is to expand our MS degree programs as professional degrees, and increase the number of specializations available. This change brings our MS degrees in line with professional CS degrees at other institutions.

5. Please list all the program requirements for the current and revised programs so that review committees can easily see the changes: (expand the table as needed and denote new courses in bold print)

Current and Revised Requirements for the MS in Computer Science

Current program	Revised program
8 4-credit graduate courses in Computer Science including:	No Change
1 Theory Course (from a list)	No Change
1 Systems Course (from a list)	No Change
1 Software Course (from a list)	No Change
1 Application Course (from a list)	No Change
Complete a master's project under the supervision of a faculty member. This project may be expanded into an MS Thesis.	Students may complete a master's project under the supervision of a faculty member, but this is not required.

Current and Revised Requirements for the MS in Computer Science with a specialization in Cyber Security

Current program	Revised program
8 4-credit graduate courses in Computer Science including:	No Change

1 Theory Course (from a list)	No Change
1 Systems Course (from a list)	No Change
1 Software Course (from a list)	No Change
1 Application Course (from a list)	No Change
At least 2 core CS Security Courses	No Change
At least 3 three CS Security Courses	No Change
Up to 2 elective non-CAS/CS security-related courses taught in a BU Reliable Information Systems and Cyber Security Center (RISCS) affiliated program.	No Change
Complete a master's project under the supervision of a faculty member. This project may be expanded into an MS Thesis.	Students may complete a master's project under the supervision of a faculty member, but this is not required.

6. Is this change a result of program learning outcomes assessment and/or academic program review? If yes, please describe:

No

7. Please list learning outcomes for the revised program:

The learning outcomes remain unchanged:

- Students graduating with a MS in Computer Science are expected to:
    - Possess a broad mastery of in-depth knowledge of Computer Science, across theory, software, systems, and applications.
- Students graduating with a MS in Cyber Security:
    - Possess a broad mastery of in-depth knowledge of Computer Science, across theory, software, systems, and applications.
    - Possess in-depth knowledge of cyber security theory and practice.

8. How does the change place your program in the context of programs at peer institutions?

In a survey of other CS programs with MS programs similar to ours, none required a research project or thesis, an MS exam, or a capstone course (except NYU as below). The majority required only coursework. The results of our survey are:

Locally:

- Harvard – 8 courses
- Brandeis – 9 courses
- UMass Amherst – courses totaling 30 credits, each course is either 3 or 4 credits
- Brown – 8 courses

Nationally:

- CMU – 8 courses

- NYU – 9 courses, capstone course required but means little as it can be done as a regular class
- Georgia Tech – 36 credits, 9 courses
- USC – 9 courses (could be 8), thesis option is available, many specializations but general CS MS is 8-9 courses

9. How does the change affect other academic units and existing programs at the University?

The proposed change has no effect on any other unit.

10. How will you notify current students of the proposed changes and implement the requirements? How will you assure that current students are able to complete their programs under the requirements that were in place at the time of their matriculation?

Notification will be by email and via the MS web pages of the CS Department website.

11. Please document any implications that the change has on professional accreditation or licensure at the program or school/college level:

Not Applicable

12. If the change includes a new course or courses, please indicate who will teach the course and how the rest of that faculty member's course load will be affected (redistributed, absorbed, etc.):

No new courses are proposed

13. Please list the resources needed including IT, new faculty, new staff, reassignment of faculty from existing courses to new ones (especially if the existing course(s) is not being removed from the bulletin), technology enhanced classrooms, office space, and other facilities. (Using the relevant template, please submit a budget even if no additional resources are needed):

Removing the research project from the MS degrees reduces the faculty resources required to offer this degree.

14. Please describe the budgetary impact that the proposed change will have:

The proposed change has no budgetary impact.

15. Please provide the bulletin copy related to the proposed academic change, listing ALL program requirements as you wish them to appear in the Bulletin:

MS in Computer Science

While an advanced degree in computer science isn't necessary to "work with computers," there is intense demand for computer professionals in many fields where a deeper and principled understanding of computer and information systems is needed. Areas of opportunity range from developing rich applications integrated with a database back-end, to interoperability of software with complex network infrastructure, to consulting opportunities involving optimization of client software and hardware. With the Master of Science, students become professionals with knowledge of the underlying principles of the main areas of computer and information systems and theory, and hands-on experience that allows them to participate in the development of new systems. Upon graduation, when confronted with a new problem, students will have sufficient facility with basic techniques and methods to research the technical literature in search of a solution or to devise new algorithmic methods. The CS program at Boston University is geared toward students with a CS undergraduate degree, but we also welcome those with equivalent computer training and experience, as well as students with gaps in their CS background but strong academic records overall.

Course Requirements

Eight semester courses (32 credits) approved for graduate study are required. Course requirements include 5 breadth courses, with at least one in each of the following areas:

- Theory
- Systems
- Software
- Applications

For a full list of approved courses, see the department website.

Among the grades received for the five breadth courses, the number of grades of B– must not be greater than the number of grades of B+ or higher. No grade lower than B– may be used for graduate credit. A minimum grade of B– is required in non-breadth courses.

Language Requirement

There is not foreign language requirement for this degree.

Master's Project

While not required, MS candidates may complete a master's project or thesis. Projects are carried out with the approval and under the supervision of a faculty member. A master's project can be expanded into a master's thesis, which requires two faculty readers.

MS in Computer Science with Specialization in Cyber Security

To meet the burgeoning demand for computer experts with deep technical training and expertise in keeping computer systems reliable and safe, we offer our master's students the opportunity to specialize in cyber security. The specialization encompasses courses that focus on technical issues related to safe software, languages, and architectures, as well as broader societal issues of privacy and legal ramifications. Through an eight-course program, students will be trained in topics ranging from cryptographic methods, data and information security, fault-tolerant computing, network security, privacy and anonymity, software safety, and system security. The computer science (CS) program at Boston University is geared toward students with a CS undergraduate degree, but we also welcome those with equivalent computer training and experience, as well as students with gaps in their CS background but strong academic records overall.

Course Requirements

The Master of Science (MS) specialization in cyber security has the same course requirements, eight graduate courses (32 credits), and core breadth course requirements as the MS in Computer Science. Course requirements are as follows:

- Five designated breadth courses, including at least one course in each of the following areas:
  - Theory
  - Systems
  - Software
  - Applications
- At least two core CS security courses
- At least three CS security-related courses
- Up to two elective non-CAS/CS security-related graduate courses, taught in a Reliable Information Systems and Cyber Security Center (RISCS) affiliated program and approved by the faculty advisor

For a full list of approved courses, see the department website.

Among the grades received for the five breadth courses, the number of grades of B– must not be greater than the number of grades of B+ or higher. The three remaining elective courses are determined in consultation with, and approved by, the student's faculty advisor. No grade lower than B– may be used for graduate credit.

A CS course can be used toward satisfying multiple requirements. For example, CAS CS 552: Introduction to Operating Systems, can be used to satisfy both the systems breadth course requirement and the cyber security requirement, or CAS CS 538: Fundamentals of Cryptography, can be used to satisfy both the applications breadth course requirement and the cyber security requirements.

Language Requirement

There is no foreign language requirement for this degree.

Master's Project

While not required, MS candidates may complete a master's project or thesis. Projects are carried out with the approval and under the supervision of a faculty member. A master's project can be expanded into a master's thesis, which requires two faculty readers.