Quickguide for the CS@CU M.S. Bridge Program in Computer Science

I. Bridge Program Curriculum

This QuickGuide is for CS@CU MS Bridge Program students completing their Bridge curriculum, typically over the first two or three semesters. CS@CU MS Bridge Program students study a foundational curriculum consisting of a broad core of 4 foundational courses, in addition to a Calculus course. Further math courses are also recommended if intending to pursue particular tracks in the MS stage.

Math Requirement

CS@CU MS Bridge Program students are required to take Calculus I (3pts) or its equivalent. Such a course covers functions, limits, single-variable differentiation, and single-variable integration.

CS@CU MS Bridge Program students who are interested in pursuing either the Machine Learning or Vision, Graphics, Interaction, and Robotics tracks are strongly recommended to take two additional math courses: Calculus III (3pts) and Computational Linear Algebra (COMS W3251, 4pts). The former covers vectors, vector functions, and partial derivatives. The latter covers standard topics in linear algebra, with an emphasis on scientific computation using Python and associated packages.

CS Bridge Curriculum

The foundational curriculum for CS@CU MS Bridge Program students is built with the following four required courses. These courses provided the necessary preparation for the MS tracks and advanced courses.

1. **Intro to CS and Programming in Java (COMS W1004, 3pts)**: Covers fundamental concepts of computer science, algorithmic problem-solving capabilities, and introductory Java programming skills.

2. **Data Structures (COMS W3134, 3pts)**: Covers data types and structures; programming techniques for processing structures, storage management, and analysis of algorithms.

3. **Advanced Programming (COMS W3157, 4pts)**: Covers practical programming techniques and tools for professional software construction, including writing code according to specifications and documentation. Taught in C and C++ in a UNIX environment; scripting languages and basic web programming included.

4. **Discrete Mathematics (COMS W3203, 4pts)**: Covers logic and proofs, mathematical induction, modular arithmetic, counting theory, graph theory, and probability.

COMS W1004, W3134, and W3157 should be taken sequentially. In addition, a fifth foundational course is strongly recommended if additional math courses are not taken. Take one of the following:

1. **Computer Science Theory (COMS W3261, 3pts)**: Covers regular languages, context-free languages, Turing machines, Chomsky hierarchy, Church-Turing thesis, complexity theory, and NP-completeness.
2. **Fundamentals of Computer Systems (CSEE W3827, 3pts)**: Covers fundamentals of computer organization and digital logic.

The former is particularly recommended for students who select the Foundations of Computer Science track during the MS portion of CS@CU MS Bridge, while the latter is helpful for those who select the
Network Systems or Software Systems tracks.

Scheduling your CS Bridge Curriculum

For a student with no technical background:

Summer 1: COMS 1004
Summer 2: COMS 3134, (Calculus I)
Fall: COMS 3157, COMS 3203
Spring: Two of COMS 3261, COMS 3827, and COMS 3251

For a student with some technical background:

Summer: COMS 3134
Fall: COMS 3157, COMS 3203
Spring: Two of COMS 3261, COMS 3827, and COMS 3251

Following successful completion of the CS@CU MS Bridge curriculum above, students will seamlessly transition into the MS program coursework as described on the next page.

II. MS Program Curriculum

The Master of Science (MS) program provides a unique opportunity to develop leading-edge in-depth knowledge of specific computer science disciplines. The department currently offers concentration tracks covering eight such disciplines.

All students must complete the following requirements:

- Complete a total of 30 points.
- Maintain at least a 2.7 overall GPA.
- Satisfy breadth requirements.
- Take at least 6 points of technical courses at the 6000-level.
- Only up to 3 points of your degree can be non-CS/non-track courses. Non-CS/non-track courses must be approved by your advisor. See track webpages for more information.

Students can choose from one of the tracks below. See track webpages for details on track requirements.

- Computational Biology
- Computer Security
- Foundations of Computer Science
- Machine Learning
- Natural Language Processing
- Network Systems
- Software Systems
- Vision, Graphics, Interaction, and Robotics
- MS Personalized
- MS Thesis