**Major in Mathematics-Computer Science (MA30)**

Graduates of this program will be mathematically oriented computer scientists who have specialized in the mathematical aspects and foundations of computer science or in the computer applications of mathematics.

A mathematics-computer science major is not allowed to also minor in computer science in the Department of Computer Science and Engineering. The detailed curriculum is given in the list below:

**Required Courses**

**Lower Division**

1.One of the following sequences:

a.Linear Algebra and Calculus:MATH 18 and 20A-B-C-D-E

b.Honors Calculus:MATH 31AH-BH-CH,MATH 20D

2.CSE 8A-B Introduction to Computer Science:Java,or CSE 11 Introduction to Computer Science:Java (Accelerated)

3.Software Tools and Techniques Laboratory:CSE 15L or CSE 29

4.Basic Data Structures and Object-Oriented Design:CSE 12

Students interested in taking course work on computer architecture and design techniques (CSE 140-140L,CSE 141-141L,CSE 142-142L,CSE 148)should take CSE 30 as preparation.

**Upper Division**

A total of fourteen upper-division courses (totaling fifty-six units)are required:

1.Mathematical Reasoning:MATH 109 (**Note:** Students completing MATH 31AH-BH-CH may substitute a four-unit upper-division mathematics elective for MATH 109.)

2.Modern Applied Algebra:MATH 103A-B or Modern Algebra:MATH 100A-B

3.Theory of Computability:CSE 105 (**Note:** CSE 21 or MATH 100A or MATH 103A or MATH 184 or MATH 184A must betaken prior to CSE 105.)

4.Computer Implementations of Data Structures:CSE 100 (**Note:** CSE 21 or MATH 154 or MATH 184 or MATH 184A must betaken prior to CSE 100.)

5.Intro to Probability:MATH 180A or 183(Note that MATH 183 is not a prerequisite for MATH 181A;further,note that duplication of credit exists between

MATH 180A/183 and ECON 120A.)

6.Discrete Math or Combinatorics:MATH 154 or 158 or MATH 184 or 188

7.Design and Analysis of Algorithms:CSE 101

8.Applied Mathematics Electives:Eight units from MATH 170A-B-C,171A-B,173A-B,174,175,179,180B-C,181A-B-C-E

9.Computational Electives:Eight units from MATH 152,154,155A-B,157,158,160A-B,168A,182,184,185,187A-B,188,189,CSE 107,110,112,120-121, 123,124,127,130,131,132A-B,134B,140-140L,141-141L,142,150A-B,151A,152A-B,158,160,165,167,168,169,176A,COGS 108,118A-B,120,185,

188

10.General Math-CS Electives:Eight additional units from any course in list #8 or #9 above or MATH 100C,102,104A-B,106,110,111A-B,114,120A-B,130, 140A-B,142A-B,144,150A-B,163,181D,181F,190A-B,193A-B,194

In order to ensure fifty-six unique upper-division units are completed,students cannot use a single course to fulfill more than one requirement for the major. Students wishing to add CSE courses are subject to enrollment restrictions.Refer to the CSE department website for further information.