SymSys major math requirements, effective September 1, 2026

The following Core Preparations requirements will be binding on students who declare the Symbolic Systems major after academic year 2025-26, but are available to all SymSys majors doing the G4 (4.0, 4.1, or 4.2) Core prior to that.

Calculus and Linear Algebra

(The Symbolic Systems Program recommends MATH rather than CME or ENGR courses as preferred ways for most students to learn multivariate calculus and linear algebra, because of their more extensive coverage of linear algebra methods used in many higher level courses which are options for the major.)

- Introduction to Multivariate Calculus and Linear Algebra. One of the following [see NOTE 1]:
    - MATH 51: Linear Algebra, Multivariable Calculus, and Modern Applications (5 units)
    - MATH 61CM: Modern Mathematics: Continuous Methods (5 units)
    - MATH 61DM: Modern Mathematics: Discrete Methods (5 units)
    - CME 100: Vector Calculus for Engineers (ENGR 154) (5 units)
- A total of 8 or more additional units, toward which any of the following may be counted:
    - Single Variable Calculus [see NOTE 2]. In most cases, a student's first 4 to 10 units toward the Calculus and Linear Algebra requirement will consist of units in this category.
        - MATH 19: Calculus (3 units)
        - MATH 20: Calculus (3 units)
        - MATH 21: Calculus (4 units)
        - 6 units replacing MATH 19 and 20, or 10 units replacing MATH 19, 20, and 21, earned through Advanced Placement or other international exams. (NB: Units cannot be counted for both AP/exam credit and the courses that the credit replaces.)
    - Other courses in multivariate calculus, linear algebra, and discrete methods.
        - MATH 52: Integral Calculus of Several Variables (5 units)
        - MATH 53: Differential Equations with Linear Algebra, Fourier Methods, and Modern Applications (5 units)
        - MATH 62CM: Modern Mathematics: Continuous Methods (5 units)
        - MATH 62DM: Modern Mathematics: Discrete Methods (5 units)
        - MATH 63CM: Modern Mathematics: Continuous Methods (5 units)
        - (Note: MATH 63DM is not included in this list, but does count for the Probability Theory and Statistics Breadth Requirement under Formal Methods.)

- MATH 104: Applied Matrix Theory (4 units)
- MATH 113: Linear Algebra and Matrix Theory (4 units)
- CME 102: Ordinary Differential Equations for Engineers (ENGR 155A) (5 units)
- CME 104: Linear Algebra and Partial Differential Equations for Engineers (ENGR 155B) (5 units)

NOTE 1: Effective Autumn 2023-24, Credit for Math 21 (which is also earned with a score to obtain 10 units of single-variable calculus credit on exams such as BC-level AP and some international exams) is an enforced prerequisite for enrolling in MATH 51 or CME 100. Please read the Math Department's rationale for requiring MATH 21 prior to a course in multivariable calculus.

NOTE 2: At the request of the Mathematics Department, the Mathematics Placement Diagnostic option that was previously available for fulfilling all or part of the Single-Variable Calculus requirement may be used by students who were declared and approved as Symbolic Systems majors before the end of the Academic Year 2022-23. See the 2022-23 Bulletin for the G4.0 requirements if you are eligible to complete them. Students who were (a) placed into MATH 51 and (b) passed MATH 51 or CME 100 with a letter grade of C- or better *prior to September 2023* may submit a Replacement Petition under the Requirement Versions Transition category to request SymSys major credit for MATH 19, 20, and 21, regardless of when they declare(d) the SymSys major.