

Progress Toward Completion of the Mathematics Major

Computer Science Concentration

Arts and Sciences students may be admitted to the math major after successfully completing a semester of multivariable calculus, a semester of linear algebra, and a 3- or 4-credit computer programming course. Visit math.cornell.edu/major for more information.

Student's Name	Net ID	Faculty Advisor
_____	_____	_____
Courses needed to complete the major		
_____	_____	initials _____
_____	_____	date _____

Math majors must complete **9 courses** for the major, as described in items 1–3 below, with a **minimum grade of C–**. MATH courses numbered 5000–5999 do not count. No course may be used to satisfy more than one requirement.

_____ At least two of the MATH courses taken must be at the 4000 level (or above).

1. Two Courses in Algebra. (___ transfer credit applied, see reverse)

- _____ MATH 3320 Introduction to Number Theory
- _____ MATH 3340* Abstract Algebra
- _____ MATH 4310* Linear Algebra
- _____ MATH 4330* Honors Linear Algebra
- _____ MATH 4340* Honors Introduction to Algebra
- _____ MATH 4370 Computational Algebra
- _____ MATH 4500 Matrix Groups
- _____ MATH 4560 Geometry of Discrete Groups
- _____ MATH 3360* Applicable Algebra
- _____ MATH 4315* Linear Algebra with Supplements

2. Two Courses in Analysis. (___ transfer credit applied, see reverse)

- _____ MATH 3110* Introduction to Analysis
- _____ MATH 3210 Manifolds & Differential Forms
- _____ MATH 3230* Introduction to Differential Equations
- _____ MATH 4130* Honors Intro Analysis I
- _____ MATH 4140 Honors Intro Analysis II
- _____ MATH 4180* Complex Analysis
- _____ MATH 4200* Differential Equations and Dynamical Systems
- _____ MATH 4210* Nonlinear Dynamics and Chaos [also MAE 5790]
- _____ MATH 4220* Applied Complex Analysis
- _____ MATH 4250 Numerical Analysis and Differential Equations [also CS 4210]
- _____ MATH 4260 Numerical Analysis: Linear & Nonlinear Equations [also CS 4220; co-meets w/CS 5223]
- _____ MATH 4280* Introduction to Partial Differential Equations

***Forbidden Overlaps:** Due to an overlap in content, students will receive credit for only one course in each group:

- (1) MATH 3110, 4130; (2) MATH 3230, 4280; (3) MATH 3340, 3360; (4) MATH 3340, 4340; (5) MATH 4180, 4220; (6) MATH 4200, 4210;
- (7) MATH 4310, 4315, 4330; (8) MATH 4710, ECON 3130, BTRY 3080; (9) MATH 4720, ECON 3130, BTRY 4090; (10) MATH 4810, 4860.

3. Concentration in Computer Science. (___ transfer credit applied, see below)

Five courses from (v) and (vi) below.

(v) At least one MATH course numbered 3000 or above:

(vi) At least three CS courses with significant mathematical content.

- _____ CS 3220 Computational Mathematics for Computer Science
- _____ CS 4110 Programming Languages and Logics [co-meets with CS 5110]
- _____ CS 4160 Formal Verification
- _____ CS 4210 Numerical Analysis and Differential Equations [also MATH 4250]
- _____ CS 4220 Numerical Analysis: Linear and Nonlinear Problems [also MATH 4260]
- _____ CS 4620 Introduction to Computer Graphics [co-meets with CS 5620]
- _____ CS 4670 Introduction to Computer Vision [co-meets with CS 5670]
- _____ CS 4700 Foundations of Artificial Intelligence
- _____ CS 4740 Natural Language Processing [also COGST 4740, LING 4474; co-meets with CS 5740]
- _____ CS 4744 Computational Linguistics [also COGST 4240, LING 4424]
- _____ CS 4775 Computational Genetics and Genomics [also BTRY 4840; co-meets with BTRY 6840]
- _____ CS 4780 Introduction to Machine Learning [co-meets with CS 5780]
- _____ CS 4786 Machine Learning for Data Science [co-meets with CS 5786]
- _____ CS 4787 Principles of Large Scale Machine Learning Systems
- _____ CS 4810 Introduction to Theory of Computing
- _____ CS 4812 Quantum Information Processing [also PHYS 4481; co-meets with PHYS 7681]
- _____ CS 4814 Introduction to Computational Complexity
- _____ CS 4820 Introduction to Analysis of Algorithms
- _____ CS 4830 Introduction to Cryptography [co-meets with CS 5830]
- _____ CS 4850 Mathematical Foundations for the Information Age
- _____ CS 4852 Networks II: Market Design [also ECON 3825, INFO 4220; co-meets with INFO 6220]
- _____ CS 4860 Applied Logic [also MATH 4860]

_____ (approved by faculty advisor)

Note: There are also many CS graduate courses with significant mathematical content that may be used. Interested students should discuss these options with their math faculty advisor (after being admitted to the math major.)

Transfer Credit / Study Abroad Courses Applied to the Major

Course Number & Title	Institution	Requirement
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- (7) MATH 4310, 4315, 4330; (8) MATH 4710, ECON 3130, BTRY 3080; (9) MATH 4720, ECON 3130, BTRY 4090; (10) MATH 4810, 4860.