MATHEMATICS (BA)

College of Arts and Sciences

Program Website (http://math.cornell.edu)

CIP: 27.0101 | **HEGIS:** 1701.00 | **NYSED:** 05718

Program Description

The mathematics major adapts to a number of purposes. It can emphasize the theoretical or the applied. It can be appropriate for professionals and nonprofessionals alike and can be broad or narrow. It can also be combined easily with serious study in another subject in the physical, biological, or social sciences by means of a double major and/or concentration. (See "Double Majors" below for more information.)

Questions concerning the major should be brought to the undergraduate coordinator. Information is also available at math.cornell.edu/major (http://math.cornell.edu/major/), including how to apply for the major.

Student Grade Option

Courses must be taken for a letter grade in order to count toward admission to the math major or to satisfy any math major requirement. A minimum grade of C- for a course to be counted toward the major.

Transfer Credit

Courses taken at another institution may be used to satisfy the math major prerequisites and to replace at most two courses toward the major requirements. These courses must be approved for transfer credit and appear on the Cornell transcript with Cornell course equivalents.

Visit the Math Department web site for more information about transferring credit from another institution.

Prerequisites

Students are admitted to the major after successfully completing a semester of *linear algebra* — MATH 2210, MATH 2230, or MATH 2940 with a grade of B– or better — and a semester of *multivariable calculus* — MATH 2220, MATH 2240, or MATH 1920 with a grade of B– or better. The department recommends MATH 2210–MATH 2220 or MATH 2230–MATH 2240.

While it is not recommended for students planning a math major, MATH 2310 with a grade of B+ or better may be accepted as a substitute for MATH 2210. A 3- or 4-credit *computer programming course* is also required with a letter grade of C– or better. Eligible courses include: CS 1110, CS 1112, CS 2110, and CS 2112.

Credit for MATH 1920 may be obtained by passing a placement exam (http://math.cornell.edu/ap/) during orientation; however, a score equivalent to a B- or better is required to satisfy the prerequisite for the math major. Students who score below a B- and wish to join the major may not attempt the exam a second time but should instead enroll in a multivariable calculus course.

Students who have taken a course in linear algebra and/or multivariable calculus during high school should consider taking MATH 2230–MATH 2240. This sequence gives a more abstract, proof-oriented treatment of the material. Students with an advanced background in linear algebra and/or multivariable calculus should contact the undergraduate coordinator (mmk8@cornell.edu) for advice as soon as possible. Note that 4000-level linear algebra courses are generally *not* regarded as meeting the prerequisites for the math major.

Students who receive below the minimum grade in one of these prerequisite courses should contact the undergraduate coordinator (mmk8@cornell.edu) immediately. Any repeated attempt to fulfill a math major prerequisite requires pre-approval from the math majors committee.

Double Majors

A double major with computer science, economics, or physics can be facilitated by the corresponding concentrations described above. The Departments of Computer Science and Economics permit double majors to use courses in the corresponding concentrations to satisfy the requirements of both majors.

Double majors with physics may count eligible physics courses toward both the physics major and the math major's math physics concentration; however, the Physics Department will not approve courses for an outside concentration if they are being used toward another major or minor.

When enrolling in cross-listed courses, double majors must take care that at least 5 courses with a MATH prefix numbered 3000 or above will appear on their transcript. Students should consult other major departments about any further conditions they may have.

Senior Thesis

A senior thesis can form a valuable part of a student's experience in the mathematics major. It is intended to allow students to conduct an in-depth investigation not possible in regular course work. The work should be independent and creative. It can involve the solution of a serious mathematics problem, or it can be an expository work, or variants of these. Conducting independent research, paying careful attention to exposition in the finished written product, and the delivery of an optional oral presentation can have a lasting positive impact on a student's educational and professional future.

Graduate Courses

Some exceptional undergraduates, upon completing a rigorous foundation of 4000-level math courses, may wish to further develop their understanding of the material in subsequent graduate courses that the Math Department offers. The core courses from the mathematics graduate program - MATH 6110, MATH 6120, MATH 6310, MATH 6320, MATH 6510, and MATH 6520 - represent a good first exposure to graduate-level mathematics. MATH 6150, MATH 6160, MATH 6210, MATH 6220, MATH 6710, and MATH 6720 cover some additional material in a manner suitable to advanced undergraduates.

Undergraduates taking graduate courses should have completed advanced undergraduate courses on the same topic with a grade of A– or better. Interested students should discuss the possibility of taking graduate courses with their faculty advisor in the Math Department prior to enrolling in the course.

Honors in Mathematics

Honors in Mathematics is awarded to graduating math majors based on excellence in and difficulty of coursework satisfying the requirements of the math major, as well as mathematical research or the completion of a senior thesis. Honors in mathematics is typically awarded competitively

to 15% or less of our graduating class. Any student receiving honors must meet the following minimum criteria:

- A median grade of an A- or better in 3000+ level coursework which satisfies the requirements of the math major. (If additional coursework is taken beyond what is needed to satisfy the requirements, it will be used when calculating the median grade.)
- The majority of upper-level math courses must be taken at the 4000 level or above, and students must have distinguished themselves. For example, the student has taken the honors sequences (MATH 4130-MATH 4140 and MATH 4330-MATH 4340) with grades of A- or better; or has taken graduate core classes (MATH 6110-MATH 6120, MATH 6310-MATH 6320, MATH 6510-MATH 6520) with grades of A- or better; or has written a senior thesis and has a strong endorsement from their advisor; or has mostly outstanding math grades (A or A+).
- Students who have not completed the requirements for a concentration in Mathematics or Applied Mathematics are expected to be exceptional to receive honors. In addition to the criteria above, they must have done outstanding work (A or A+) in the courses counting towards the math major in their concentration. A deep mathematical component to the work in their concentration is required.

(The honors criteria described here will start for all graduates in the 2026-2027 academic year. In prior years, these were the standards for awarding magna cum laude honors in mathematics.)

Program Information

- Instruction Mode: In Person
- Location: Ithaca, NY
- Minimum Credits for Degree: 120

Program Requirements

The minimum number of required credits to complete the major is 27. However, typical students accrue between 32 and 36 credits.

Students must complete nine courses, as described in items 1–3 below, under the following constraints:

- At least 5 courses with a MATH prefix numbered 3000 or above must appear on the student's transcript. (Double majors enrolling in cross-listed courses should pay particular attention to this constraint.)
- At least two of the MATH courses taken must be at the 4000-level (or above).
- A course may be counted toward the major only if it is taken for a letter grade and a grade of C– or better is received for the course.
- No course may be used to satisfy more than one requirement for the major.
- 2-credit courses count as half courses.
- MATH courses numbered between 4980 and 5999 do not count toward the major.

Major advisors may make adjustments to the major requirements upon request from an advisee, provided the intent of the requirements is met. In particular, many suitable graduate courses are not listed here but are available for undergraduates who are well prepared. Prior approval is required to count graduate courses toward the algebra, analysis, or topology/geometry requirement.

1. Courses in Algebra (2 courses)

Code	Title	Hours
Select two of the following eligible courses:		
MATH 3320	Introduction to Number Theory	4
MATH 3340	Abstract Algebra	4
MATH 3360	Applicable Algebra	4
MATH 4310	Linear Algebra	4
MATH 4330	Honors Linear Algebra	4
MATH 4340	Honors Introduction to Algebra	4
MATH 4370	Computational Algebra	3
MATH 4500	Matrix Groups	4

2. Courses in Analysis (2 courses)

Code	Title	Hours
Select two of the following eligible courses:		
MATH 3110	Introduction to Analysis	4
MATH 3210	Manifolds and Differential Forms	4
MATH 3270	Introduction to Ordinary Differential Equations	3
MATH 4130	Honors Introduction to Analysis I	4
MATH 4140	Honors Introduction to Analysis II	4
MATH 4180	Complex Analysis	4
MATH 4200	Differential Equations and Dynamical Systems	3
MATH 4210	Nonlinear Dynamics and Chaos	3
MATH 4220	Applied Complex Analysis	3
MATH 4250	Numerical Analysis and Differential Equations	4
MATH 4260	Numerical Analysis: Linear and Nonlinear Problems	4
MATH 4280	Introduction to Partial Differential Equations	4

3. Further High-Level Mathematical Courses (5 courses)

A. Concentration in Mathematics

i. Four Additional MATH Courses Numbered 3000 or Above

At least one of the four courses must be among the geometry/topology courses.

Code	Title	Hours
Select one of the following eligible geometry/topology courses: [1]		
MATH 3210	Manifolds and Differential Forms	4
MATH 4500	Matrix Groups	4
MATH 4520	Classical Geometries and Modern Applications	4
MATH 4530	Introduction to Topology	4
MATH 4540	Introduction to Differential Geometry	4

[1] MATH 3210 is eligible only if not used for the analysis requirement; MATH 4500 is eligible only if not used toward the algebra requirement.

ii. One Course Dealing with Mathematical Models[1]

Eligible courses include MATH 3610 and any course from outside mathematics with serious mathematical content that deals with scientific matters. Serious mathematical content includes, but is not limited to, extensive use of calculus or linear algebra. Any course from another

department that would satisfy one of the concentrations may be used, as well as:

Code	Title	Hours
CS 2110	Object-Oriented Programming and Data Structures	4
PHYS 1116	Physics I: Mechanics and Special Relativity	4
PHYS 2208	Fundamentals of Physics II	4
PHYS 2213	Physics II: Electromagnetism	4
PHYS 2217	Physics II: Electricity and Magnetism	4

[1] Other 1000-level physics courses and PHYS 2207 Fundamentals of Physics I may not be used, but some courses in other fields may be accepted. AP credit may not be used. CS 2110 may not be used if it was used for the computer programming prerequisite for entry into the major.

B. Concentration in Applied Mathematics

Five additional courses from (iii) and (iv) below, of which at least three are from (iii) and one is from (iv). Of the 9 courses used to fulfill requirements (1), (2), (3 iii), and (3 iv) of the math major with an applied mathematics concentration, at least one course must be taken from three of the four Groups A, B, C, and D below. Non-MATH courses in these groups may be used toward the math modeling requirement (3 iv).

iii. MATH Courses Numbered 3000 or Above
iv. Courses Dealing with Mathematical Models[1]

Eligible courses include MATH 3610 and any course outside mathematics with serious mathematical content that deals with scientific matters. Serious mathematical content includes, but is not limited to, extensive use of calculus or linear algebra. Any course from another department that would satisfy one of the concentrations may be used. At most one of the following may be used:

Code	Title	Hours
CS 2110	Object-Oriented Programming and Data Structures	4
PHYS 1116	Physics I: Mechanics and Special Relativity	4
PHYS 2208	Fundamentals of Physics II	4
PHYS 2213	Physics II: Electromagnetism	4
PHYS 2217	Physics II: Electricity and Magnetism	4

[1] Other 1000-level physics courses and PHYS 2207 may not be used, but some courses in other fields may be accepted. AP credit may *not* be used. CS 2110 may not be used if it was used for the computer programming prerequisite for entry into the major.

Group A. Differential Equations

Code	Title	Hours
MATH 3270	Introduction to Ordinary Differential Equations	3
MATH 4200	Differential Equations and Dynamical Systems	3
MATH 4210	Nonlinear Dynamics and Chaos	3
MATH 4280	Introduction to Partial Differential Equations	4

Group B. Discrete Mathematics and Combinatorics

Code	Title	Hours
MATH 3360	Applicable Algebra	4
MATH 4370	Computational Algebra	3
MATH 4410	Introduction to Combinatorics I	4
MATH 4420	Introduction to Combinatorics II	4
CS 4820	Introduction to Analysis of Algorithms	4
ECON 4020	Game Theory I	3
ORIE 3300	Optimization I	4
ORIE 4350	Introduction to Game Theory	4

Group C. Numerical and Computational Methods

Code	Title	Hours
MATH 4250	Numerical Analysis and Differential Equations	4
MATH 4260	Numerical Analysis: Linear and Nonlinear Problems	4
CS 4620	Introduction to Computer Graphics	3
CS 4670	Introduction to Computer Vision	4
MAE 4700	Finite Element Analysis for Mechanical and Aerospace Design	4

Group D. Probability and Statistics

Code	Title	Hours
MATH 4710	Basic Probability	4
MATH 4720	Statistics	4
MATH 4740	Stochastic Processes	4
ECON 3130	Probability and Statistics	4
ECON 4130	Statistical Decision Theory	3
ORIE 3500	Eng Probability and Statistics: Modeling and Data Science II	4
STSCI 3080	Probability Models and Inference	4
STSCI 3100	Statistical Sampling	4
STSCI 4030	Linear Models with Matrices	4

C. Concentration in Computer Science

Five additional courses from (v) and (vi) below, of which at least one is from (v) and three are from (vi).

v. MATH Courses Numbered 3000 or Above
vi. Computer Science Courses with Significant Mathematical Content[1]

Eligible courses are:

Code	Title	Hours
CS 3220	Computational Mathematics for Computer Science	3
CS 3700	Foundations of AI Reasoning and Decision-Making	3
CS 3780	Introduction to Machine Learning	4
CS 4110	Programming Languages and Logics	4
CS 4160	Formal Verification	4
CS 4210	Numerical Analysis and Differential Equations	4
CS 4220	Numerical Analysis: Linear and Nonlinear Problems	4
CS 4620	Introduction to Computer Graphics	3
CS 4670	Introduction to Computer Vision	4
CS 4740	Natural Language Processing	4
CS 4744	Computational Linguistics I	4
CS 4756	Robot Learning	4
CS 4775	Computational Genetics and Genomics	4
CS 4783	Mathematical Foundations of Machine Learning	4
CS 4787	Principles of Large-Scale Machine Learning Systems	4
CS 4789	Introduction to Reinforcement Learning	3
CS 4810	Introduction to Theory of Computing	3

CS 4814	Introduction to Computational Complexity	3
CS 4820	Introduction to Analysis of Algorithms	4
CS 4830	Introduction to Cryptography	3
CS 4850	Probability, Vectors, and Matrices in Computing	4
CS 4852	Networks II: Market Design	3
CS 4860	Applied Logic	3

[1] 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).

D. Concentration in Economics

Five additional courses from (vii), (viii), and (ix) below, as follows: one course from (vii), three courses from (viii), and a fifth course from any of (vii), (viii), or (ix).

vii. MATH Courses Numbered 3000 or Above
viii. Economics Courses with Significant Mathematical Content[1]
Eligible courses are:

Code	Title	Hours
ECON 3130	Probability and Statistics	4
or ECON 6190	Econometrics I	
ECON 3140	Econometrics	4
or ECON 6200	Econometrics II	
ECON 3825	Networks II: Market Design (crosslisted)	3
ECON 4020	Game Theory I	3
ECON 4130	Statistical Decision Theory	3
ECON 4140	Methods and Computation in Program Evaluation	3
ECON 4907	The Economics of Asymmetric Information and Contracts	3
ECON 6090	Microeconomic Theory I	4
ECON 6100	Microeconomic Theory II	4
ECON 6130	Macroeconomics I	4
ECON 6140	Macroeconomics II	4

[1] Undergraduate enrollment in ECON graduate courses requires permission of instructor.

ix. Courses in Operations Research with Significant Mathematical Content and Dealing with Material of Interest in Economics
Eligible courses are:

Code	Title	Hours
ORIE 3300	Optimization I	4
ORIE 3310	Optimization II	4
ORIE 3741	Learning with Big Messy Data	4
ORIE 4350	Introduction to Game Theory	4
ORIE 4580	Simulation Modeling and Analysis	4
ORIE 4600	Introduction to Financial Engineering	3
ORIE 4740	Statistical Data Mining I	4
ORIE 5600	Financial Engineering with Stochastic Calculus I	4
ORIE 5610	Financial Engineering with Stochastic Calculus II	4

E. Concentration in Mathematical Biology

Five additional courses from (x) and (xi) below, with three courses from (x) and two courses from (xi).

x. Biology Courses that Have Mathematical Content and Provide Background Necessary for Work at the Interface Between Biology and Mathematics
Eligible courses are:

Code	Title	Hours
BIOCB 3620	Dynamic Models and Data in Biology	4
BIOCB 4381	Biomedical Data Mining and Modeling	3
BIOCB 4810	Population Genetics	4
BIOCB 4830	Quantitative Genomics and Genetics	4
BIOCB 4840	Computational Genetics and Genomics	4
BIOCB 4910	Advanced Population Genetics	3
BIOEE 3550	Data Analysis and Visualization in Ecology and Environmental Science	3
BIONB 4220	Modeling Behavioral Evolution	4
BME 3110	Cellular Systems Biology	3
BME 3300	Introduction to Computational Neuroscience	3-4
BTRY 3080	Probability Models and Inference	4
BTRY 4090	Theory of Statistics	4
NTRES 4120	Wildlife Population Analysis: Techniques and Models	3

xi. MATH Courses Numbered 3000 or Above
Particularly appropriate are:

- MATH 4200 Differential Equations and Dynamical Systems
- MATH 4710 Basic Probability

F. Concentration in Mathematical Physics

Five additional courses from (xii) and (xiii) below, of which at least one is from (xii) and three are from (xiii).

xii. MATH Courses Numbered 3000 or Above
xiii. Physics Courses that Make Significant Use of Advanced Mathematics
Eligible courses are:

Code	Title	Hours
PHYS 3316	Basics of Quantum Mechanics	4
PHYS 3317	Applications of Quantum Mechanics	4
PHYS 3318	Analytical Mechanics	4
PHYS 3327	Advanced Electricity and Magnetism	4
PHYS 4230	Statistical Thermodynamics	4
PHYS 4443	Intermediate Quantum Mechanics	4
PHYS 4444	Introduction to Particle Physics	4
PHYS 4445	Introduction to General Relativity	4
PHYS 4454	Introductory Solid State Physics	4
PHYS 4481	Quantum Information Processing	3
PHYS 4488	Statistical Mechanics	3
AEP 4340	Fluid and Continuum Mechanics	4
AEP 4400	Nonlinear and Quantum Optics	3

G. Concentration in Operations Research

Five additional courses from (xiv) and (xv) below, of which at least one is from (xiv) and three are from (xv).

xiv. MATH Courses Numbered 3000 or Above
xv. Courses in Operations Research in Which the Primary Focus Involves Mathematical Techniques
Eligible courses are:

Code	Title	Hours
ORIE 3300	Optimization I	4
ORIE 3310	Optimization II	4
ORIE 3500	Eng Probability and Statistics: Modeling and Data Science II	4
ORIE 3510	Stochastic Processes for Decision-Making	4
ORIE 3741	Learning with Big Messy Data	4
ORIE 4330	Discrete Models	4
ORIE 4350	Introduction to Game Theory	4
ORIE 4580	Simulation Modeling and Analysis	4
ORIE 4600	Introduction to Financial Engineering	3
ORIE 4630	Operations Research Tools for Financial Engineering	4
ORIE 4740	Statistical Data Mining I	4
ORIE 4742	Info Theory, Probabilistic Modeling, and Deep Learning with Scientific and Financial Apps	3
ORIE 5600	Financial Engineering with Stochastic Calculus I	4
ORIE 5610	Financial Engineering with Stochastic Calculus II	4
ORIE 5640	Statistics for Financial Engineering	4

H. Concentration in Statistics

Five additional courses from (xvi), (xvii), and (xviii) below. No substitutions are allowed for MATH 4710 or MATH 4720. Students who have already taken a course with overlapping content should contact the undergraduate coordinator (mmk8@cornell.edu). (For students who have not had experience with real-world data, MATH 1710 is recommended before or concurrent with MATH 4710. It will not, however, count toward any of the math major requirements.)

xvi. Both

- MATH 4710 Basic Probability
- MATH 4720 Statistics

xvii. One Additional MATH Course Numbered 3000 or Above
xviii. Two Courses in Other Departments with Significant Content in Statistics, Complementing (xvii)[1]
Eligible courses are:

Code	Title	Hours
BIOCB 4381	Biomedical Data Mining and Modeling	3
BIOCB 4830	Quantitative Genomics and Genetics	4
CS 3700	Foundations of AI Reasoning and Decision-Making	3
CS 3780	Introduction to Machine Learning	4
CS 4740	Natural Language Processing	4
CS 4789	Introduction to Reinforcement Learning	3
ECON 3140	Econometrics	4
ORIE 3741	Learning with Big Messy Data	4
ORIE 4740	Statistical Data Mining I	4
STSCI 3100	Statistical Sampling	4
STSCI 3510	Stochastic Processes for Decision-Making	4
STSCI 3740	Data Mining and Machine Learning	4
STSCI 3900	Causal Inference	3
STSCI 4030	Linear Models with Matrices	4
STSCI 4060	Python Programming and its Applications in Statistics	4
STSCI 4100	Multivariate Analysis	4
STSCI 4110	Categorical Data	3
STSCI 4140	Applied Design	4
STSCI 4270	Introduction to Survival Analysis and Loss Models	3
STSCI 4520	Statistical Computing	4
STSCI 4550	Applied Time Series Analysis	4
STSCI 4780	Bayesian Data Analysis: Principles and Practice	4

[1] STSCI 3510/ORIE 3510 may not be counted toward (xviii) if MATH 4740 is used for (xvii). At most one regression course (ECON 3140 or STSCI 4030/BTRY 4030) is allowed for (xviii). At most one of CS 3780, ORIE 4740, or STSCI 3740 is allowed for (xviii).

University Graduation Requirements Requirements for All Students

In order to receive a Cornell degree, a student must satisfy academic and non-academic requirements.

Academic Requirements

A student's college determines degree requirements such as residency, number of credits, distribution of credits, and grade averages. It is the student's responsibility to be aware of the specific major, degree, distribution, college, and graduation requirements for completing their chosen program of study. See the individual requirements listed by each college or school or contact the college registrar's office (https://registrar.cornell.edu/service-resources/college-registrar-directory/) for more information.

Non-academic Requirements

Conduct Matters. Students must satisfy any outstanding sanctions, penalties or remedies imposed or agreed to under the Student Code of Conduct (Code) or Policy 6.4. Where a formal complaint under the Code or Policy 6.4 is pending, the University will withhold awarding a degree otherwise earned until the adjudication process set forth in those procedures is complete, including the satisfaction of any sanctions, penalties or remedies imposed.

Financial Obligations. Outstanding financial obligations will not impact the awarding of a degree otherwise earned or a student's ability to access their official transcript. However, the University may withhold issuing a diploma until any outstanding financial obligations owing to the University are satisfied.

Additional Requirements for Undergraduate Students

The University has two requirements for graduation that must be fulfilled by all undergraduate students: the swim requirement, and completion of two physical education courses. For additional information about fulfilling University Graduation Requirements, see the Physical Education website (https://scl.cornell.edu/pe/).

Physical Education

All incoming undergraduate students are required to take two credits (two courses) of Physical Education prior to graduation. It is recommended they complete the two courses during their first year at Cornell. Credit in

Physical Education may be earned by participating in courses offered by the Department of Athletics and Physical Education (https://courses.cornell.edu/preview_program.php?catoid=60&poid=30232) and Cornell Outdoor Education, by being a registered participant on a varsity athletic team, or performing in the marching band.

Students with medical concerns should contact the Office of Student Disability Services (http://sds.cornell.edu/).

Swim Requirement

The Faculty Advisory Committee on Athletics and Physical Education has established a basic swimming and water safety competency requirement for all undergraduate students. Normally, the requirement is taken during the Fall Orientation process at Helen Newman Hall or Teagle Hall pools. The requirement consists of the following: jump or step feet-first into the deep end of the pool, float or tread for one minute, turn around in a full circle, swim 25 yards using any stroke(s) of choice without touching the bottom or holding on to the sides (there is no time limit) and exit from the water. Students who do not complete the swim requirement during their first year, during a PE swim class or during orientation subsequent years, will have to pay a $100 fee. Any student who cannot meet this requirement must register for PE 1100 Beginning Swimming as their physical education course before electives can be chosen.

If a student does not pass the swim requirement in their first Beginning Swimming PE class, then the student must take a second Beginning Swimming PE class (PE 1100 or PE 1101). Successful completion of two Beginning Swimming classes (based on attendance requirements) with the instructor's recommendation will fulfill the University's swim requirement.

Students unable to meet the swim requirement because of medical reasons should contact the Office of Student Disability Services (http://sds.cornell.edu/). When a waiver is granted by the Faculty Committee on Physical Education, an alternate requirement is imposed. The alternate requirement substitute is set by the Director of Physical Education.

College of Arts and Sciences Graduation Requirements

Undergraduate Degrees

Graduation Requirements for the Bachelor of Arts Degree

Credit Requirement: 120 academic credits are required, 100 of which must be taken in the College of Arts & Sciences. 100 credits in Arts & Sciences is a minimum number, as is the 120 credit total. A minimum of 80 credits must be in courses for which a letter grade was received. AP, IB, CASE and A-Level credits count toward the 120 total credits but not toward the 100 A&S credits. Transfer credits for non-transfer students cannot count towards the 100 A&S credits. (See list of courses (https://as.cornell.edu/registrar/courses-that-dont-count/) that do not count as academic credit.)

Residency Requirement: eight full-time semesters in residence (in person) are expected to complete degree requirements with a minimum of six full-time semesters being required. External transfer students must complete a minimum of four full-time residence semesters.

First-year Writing Seminar (FWS) Requirement: two courses are required. A 5 on either the AP English Composition or Literature exam, or a 7 on the IB HL English Literature or Language exam will count towards one of these seminars. First-year students should take an FWS during their first semester at Cornell and are required to complete two by the end of their sophomore year.

Foreign Language Requirement: a student must either pass an intermediate Cornell language course at the 2000-level or above (Option 1) or complete at least 11 credits in a single foreign language at Cornell (Option 2). AP and IB credits cannot complete this requirement, but usually indicate that a student can place into a higher level course. Note: Native speakers of a foreign language may be exempted from this requirement. For a list of language offerings and placement, see Language Study at Cornell.

Distribution Requirement: Must take a minimum of 8 courses of at least 3 credits to fulfill 10 distribution categories. How an individual course is categorized is indicated with the appropriate abbreviation in its course description. It is important to recognize that only courses with the proper designation in the catalog can be used toward fulfilling the distribution requirements in Arts and Sciences. Unless otherwise specified, variable credit courses, including independent study courses, may not be used for distribution credit.

Arts & Sciences Distribution Requirement Categories:

- Arts, Literature, and Culture (ALC-AS)
- Biological Sciences (BIO-AS)
- Ethics and the Mind (ETM-AS)
- Global Citizenship (GLC-AS)
- Historical Analysis (HST-AS)
- Physical Sciences (PHS-AS)
- Social Difference (SCD-AS)
- Social Sciences (SSC-AS)
- Statistics and Data Science (SDS-AS)
- Symbolic and Mathematical Reasoning (SMR-AS)

Distribution Requirement Definitions

Arts, Literature, and Culture (ALC-AS)
Courses in this area examine arts, literature, and culture in various contexts. Students gain insights into the interplay of individual or collaborative creativity and social practice, and understand the complexities of the expression of the human condition. Topics include the analysis of artworks and literary texts, and the belief systems of social groups, cultures, and civilizations; they also focus on artistic expression itself (in creative writing, performing arts, and media such as film and video).

Biological Sciences (BIO-AS)
Courses in this area focus on understanding a wide range of life forms, from single cells to plants, animals, and their ecosystems. Topics include the molecular and biochemical makeup of life, the sub-cellular, cellular and organismal structures of life, and the evolutionary relatedness of all life forms. Students learn to describe how organisms are connected to each other and to their physical environment. Many courses address how genetic information is expressed from DNA, and how this expression leads to complex function and behavior.

Ethics and the Mind (ETM-AS)
Courses in this area investigate the human mind and its capacities, ranging from cognitive faculties shared by humans and animals such as perception, to language and abstract reasoning, to the ability to form and justify ethical values. Courses investigating the mind may use the methodologies of psychology, linguistics, or philosophy. Those focusing on ethics explore ways of reflecting on questions that concern the

nature of justice, the good life, or human values in general. Many courses combine these topics and methodologies.

Global Citizenship (GLC-AS)
Courses in this area examine the history, culture, politics, religion, and social relations of peoples in different parts of the world, as well as their interactions. They encourage students to think broadly about the global community and their place within it, beyond the boundaries of their particular national or cultural group, and cultivate skills of intercultural engagement that are vital to their role as global citizens. These courses introduce students to global challenges such as war and peace, social and economic inequalities, international migration, and environmental sustainability, and encourage students to think critically about international responses to these challenges.

Historical Analysis (HST-AS)
Courses in this area train students in the analysis of documentary, material, and oral evidence about social phenomena, institutions, events and ideas of the past. Students learn to evaluate and critically assess differing analyses and interpretations of former times so that they may acquire a better understanding of the origins and evolution of the present. Questions addressed in HA courses include why and under what circumstances changes have occurred in how people have interacted with one another and with the environments in which they live.

Physical Sciences (PHS-AS)
Courses satisfying this requirement provide an appreciation of how science generates and categorizes enduring knowledge of our physical world. This includes the physics, chemistry, and technology involved, of everything from light to atoms, DNA molecules, Earth science, our Solar system, and to the Cosmos. These courses expose students to both the process and some of the substance of science. By learning the universal aspects of scientific enquiry, students will be better equipped to form opinions on scientific issues that affect the world.

Social Difference (SCD-AS)
Courses in this area examine social differences relevant to the human experience. Social categories include class, race, ethnicity, indigeneity, nationality, language, religion, gender, sexuality, and ability as objects of study. Students develop a deeper understanding of these categories and their intersections. Topics may include: how hierarchies in power and status shape social differences; how social, economic and political systems can impact the interpretation of social differences; and how differences attributed to various groups are explained.

Social Sciences (SSC-AS)
Courses in this area examine social, economic, political, psychological, demographic, linguistic, and relational processes. Topics include understanding how different social contexts, for example neighborhoods, families, markets, networks, or political organizations, shape social life. Students learn to identify, describe, and explain the causes and consequences of social phenomena using quantitative and/or qualitative evidence based on systematic observation of the social world. They also learn to link evidence to theory through rigorous and transparent reasoning, and/or reflect critically on the concepts through which people make sense of the social world.

Statistics and Data Science (SDS-AS)
Courses in this area develop data literacy, essential to be an informed citizen in today's world. Students learn and apply statistical and computational techniques to effectively collect, visualize, analyze and interpret data, and present conclusions. Applications span a wide variety of contexts: providing a better understanding of the communities in which we live, guiding and enriching our lives, and driving forward scientific inquiry. Students gain an appreciation of how to ask the right questions, and how statistics can depend on the context, assumptions, and limitations of data.

Symbolic and Mathematical Reasoning (SMR-AS)
Courses satisfying this requirement help students develop the skills to solve problems through understanding abstract, logical relationships. Such skills include mathematical analysis of patterns and phenomena, modeling natural and technological systems, and creating algorithms essential to computation. These courses explore specific quantitative and symbolic methods, strategies for applying logical reasoning in diverse areas, and the intrinsic elegance of mathematics.

Major Requirement: students must complete the requirements for at least one major in A&S. See individual major listings for major requirements.

Physical Education Requirement: completion of the university requirement of two PE courses and passing the swim test. Note: physical education credit is not academic credit and does not count toward the 120 credits needed to graduate.

Policies on Applying Cornell and Non-Cornell Courses and Credits to Distribution Requirements

Restrictions on Applying AP/Test Credit and Courses from Other Institutions to the Distribution Requirements

- Students may not apply AP/test credit or transfer credit from another institution to the distribution requirements.
- Students who transfer to the college from another institution are under the above rules for advanced placement credit, but are eligible to have credit for post–high school course work taken during regular full-time semesters (not summer terms) at their previous institution count toward all distribution requirements. Transfer students receive a detailed credit evaluation when they are accepted for admission.

Restrictions on Applying Cornell Courses to the Distribution Requirements

- First-year writing seminars and ENGL 2880 Expository Writing or ENGL 2890 taken to satisfy a first-year writing seminar requirement may not count toward any other college or major requirement.
- Only courses with the proper designation in the Courses of Study can be used toward fulfilling the distribution requirements in Arts and Sciences.
- Students may not petition to change the category of any given course, nor may any faculty member change the category of a course for an individual student. Faculty members wishing to change the category for a course in which they are the primary instructor must petition the Educational Policy Committee for a change in category. If granted, the new category must be applied to the course as a whole and not for an individual student.

Courses That May Fulfill More Than One Requirement

- A course may fulfill more than one college requirement in any of the following situations:
- A course may be used to fulfill distribution and a major requirement (except if prohibited by one of the restrictions noted on applying AP/test credit, transfer credit, and Cornell courses to distribution requirements).

- A course may satisfy a maximum of two distribution categories. Students can only double-count distribution requirements on a maximum of two courses.
- A one-semester course in foreign literature (not language) or culture that is acceptable for certifying option 1 in that language may also be applied to the relevant distribution requirement.
- Courses may count toward any other requirement except first-year writing seminars.

Credit Requirement

Credits and Courses: Students must earn a minimum of 120 academic credits (which may include AP/test credits). Of the 120, a minimum of 100 must be from courses taken in the College of Arts and Sciences at Cornell.

Courses that do not count toward the 120 credits required for the degree. The College of Arts and Sciences does not grant credit toward the degree for every course offered by the university. Courses in military training, service as a teaching assistant, physical education, remedial or developmental training, precalculus mathematics, supplemental science and mathematics, offered by the Learning Strategies Center, and English as a second language are among those for which degree credit is not awarded. Students can view the list of courses that do not count for academic credit here (https://as.cornell.edu/registrar/courses-that-dont-count/).

Other cases in which a course may not receive credit include the following:

- A course identified as a prerequisite for a subsequent course may not be taken for credit once a student completes that subsequent course.
- A repeated course. (For more information, see "Repeating courses," below.)
- A "forbidden overlap," that is, a course with material that significantly overlaps with material in a course a student has already taken. Students should consult the list of Forbidden Overlaps for more information.

Courses that count toward the 100 required Arts and Sciences credits may include liberal arts courses approved for study abroad during a semester or academic year of full-time study (not summer abroad study), courses taken in certain off-campus Cornell residential programs, and a maximum of three courses that majors may accept from other colleges at Cornell as fulfilling major requirements. A&S courses taken in Cornell's summer session may count towards the 100 A&S credits.

Courses that do not count toward the 100 required Arts and Sciences credits include credits earned in other colleges at Cornell (except in the cases specifically noted in this section), transfer credits earned in any subject at institutions other than Cornell, and advanced placement/test credits. AP/test credits count as part of the 120 credits required for the degree but not as part of the 100 Arts and Sciences credits and may not be applied to distribution requirements. AP credits are posted on the transcript. If, subsequently, a student takes the course out of which they had placed, the AP credit will be removed because of the overlap in content.

Repeating Courses

Students occasionally need to repeat courses. Some courses, such as independent study, some music and performance courses, and specific topical seminars, in which content is significantly different, do grant credit when the course is taken more than once. For all repeated courses, both grades appear on the transcript and are included in both the term and cumulative GPA. For repeated courses that do not grant credit more than once, only one instance counts toward degree credits and requirements.

Residency Requirement

The College of Arts & Sciences is a residential community and students typically spend eight semesters of full-time study in residence to earn the B.A. degree.

The completion of a fall or spring term as a full-time registered student at Cornell counts as a semester in residence. Summer and winter terms at Cornell, study in Cornell's School of Continuing Education and at other institutions do not count as semesters of residence.

The residency requirement has two components: a minimum number of semesters in residence and a requirement to spend the last full-time semester of study in residence.

Students matriculating into the College of Arts & Sciences as first-year students must have a minimum of six semesters in residence before graduating. First-year matriculants into A&S can count up to two semesters in an approved off-campus program as semesters in residence. Approved off-campus programs include A&S approved study abroad programs, Cornell in Washington, Cornell in Rome, and the Cornell-China & Asia-Pacific Studies (CAPS) Program.

Students who transfer into the College of Arts & Sciences after matriculating in their first-year in another Cornell college (internal transfers) must have a minimum of six semesters in residence, and a minimum of two semesters in the College of Arts and Sciences before graduating. Internal transfers can count up to two semesters in an approved off-campus program as semesters in residence.

Students who transfer into Cornell from another institution (external transfers) must have a minimum of four semesters in residence, and a minimum of two semesters in the College of Arts & Sciences, before graduating. External transfers can count up to one semester in an approved off-campus program as a semester in residence.

In addition to the minimum number of semesters in residence, all students must complete their final full-time semester of study (i.e., the last semester in which at least 9 academic credits are needed to meet graduation requirements) in residence. Students who have fewer than 9 credits to complete degree requirements, and have met the minimum number of semesters residency requirement, may elect to complete their degree requirements during Cornell summer and winter terms registered as an A&S student or at another institution with approved transfer credit. Students cannot meet final degree requirements registered as an extramural student at Cornell.

Exceptions to the residence requirement are not petitionable.

Foreign Language Requirement

The faculty considers competence in a foreign language essential for an educated person. Studying a language other than one's own helps students understand the dynamics of language, our fundamental intellectual tool, and enables students to understand another culture. The sooner a student acquires this competence, the sooner it will be useful. Hence, work toward the foreign language requirement should be undertaken in the first two years. Students postponing the language requirement for junior and senior years risk not graduating on time. Courses in foreign languages and/or literature are taught in the College of Arts and Sciences by the following departments: Africana Studies and

Research Center, Asian Studies, Classics, Comparative Literature, German Studies, Linguistics, Near Eastern Studies, and Romance Studies. For a list of languages and placement see Language Study at Cornell.

The language requirement may be satisfied in one of the following ways:

Option 1 (FLOPI): Passing (a) a non-introductory foreign language course of 3 or more credits at Cornell at the 2000-level or above or (b) any other non-introductory course at the 2000-level or above conducted in a foreign language at Cornell. OR

Option 2: Passing at least 11 credits of study in a single foreign language (taken in the appropriate sequence) at Cornell.

Any exceptions to these rules will be noted elsewhere in individual department descriptions.

Students whose speaking, reading, and writing competence in a language other than English is at the same level we would expect our entering first-year students to have in English (as shown by completing high school in that language or by special examination during their first year here at Cornell) are exempt from the college's language requirement.

Major Requirement

Most departments and programs specify certain prerequisites for admission to the major; they are found on the pages for each department and program available at Degree Programs.

Students may apply for acceptance into the major as soon as they have completed the prerequisites and are confident of their choice. This may be as early as the second semester of their first year, and must be no later than the end of the second semester of sophomore year. A student without a major at the beginning of the junior year is not making satisfactory progress toward the degree and risks not being allowed to continue in the college. Undeclared first-term juniors must file a Late Declaration of Major form with Student Services and may be placed on a leave of absence during their junior year if they have not yet declared a major.

Double Majors

Completion of one major is required for graduation. Some students choose to complete more than one major. No special permission or procedure is required; students simply become accepted into multiple majors and are assigned to an advisor in each department. All completed majors are posted on the official transcript. Students are not allowed to continue their studies past their eighth semester to complete additional majors.

Early and Delayed Graduation

Graduating Early

A student may elect to graduate early if they are able to complete all graduation requirements in fewer than eight semesters.

Students must still satisfy the college's residency requirement as part of the graduation requirements. This residency requirement requires that students who are first-year matriculants into Cornell spend a minimum of six semesters in residence, external transfers must spend a minimum of four. To request an early graduation, students must notify the A&S Registrar's Office in KG 17 Klarman Hall or at as-studentservices@cornell.edu (as-studentservices@cornell.edu?subject=Early%20Graduation%20Request).

The earliest a student can request to graduate early and officially change their graduation date is immediately following the pre-enrollment period for their anticipated final semester. The student should have pre-enrolled in the classes required to meet the graduation requirements by the requested graduation date. The student must then complete Part I in DUST and have Part II completed by their major advisor.

Graduating Late: Ninth Term Enrollment

The Bachelor of Arts degree is expected to be completed in eight terms. If degree requirements cannot be completed in eight terms, students may seek permission to continue their studies. Requests will only be granted for students who have found themselves in emergent circumstances beyond their control which have prevented them from completing the degree in eight terms. Requests cannot be made until a student's final expected graduation term and will not be reviewed and approved until after the university drop deadline for that semester. Study beyond the eighth term is not automatically granted for the purposes of changing a major. Such requests must be discussed with a college academic advisor and require registrar approval. Requests to add an additional major or minor will not be approved for study beyond the eighth term.

If approved, students in the ninth and tenth term will be on a conditional status and will have restrictions placed on their enrollment to ensure successful completion of their degree. To request a ninth term, students must have their faculty advisor update Part II for any remaining major requirements. They will also need to submit a study plan to their college advisor listing the specific courses that will meet degree requirements for one major.

Student may elect to prorate credits if enrolling in 9 or fewer credits or take a full-time load if they desire. However, enrollment will be limited to 18 credits for the term so students can focus on their remaining required courses. In the rare case where a student may need to enroll in a tenth term to complete their degree, they will be required to prorate tuition and their enrollment will be limited to only the courses/credits needed for successful completion of one major. Additional enrollments will not be allowed.

Graduation Procedures

Application to Graduate

In the first semester of their senior year, students are prompted by Arts & Sciences Student Services to complete an online application to graduate. The application is intended to help seniors identify problems early enough in the final year to make any necessary changes in course selection to satisfy those requirements. Nonetheless, ensuring graduation requirements are fully met is the student's responsibility and any problems that are discovered, even late in the final semester, must be resolved by the student before the degree can be granted. Students are responsible for checking their DUST (https://data.arts.cornell.edu/as-stus/degree_reqts.cfm) reports and transcripts each term and alerting Student Services of any problems with their academic record. To check on their progress in the major, students should consult with their major advisors.

Degree Dates

Cornell has three official degree conferral dates in the year: December, May, and August. Students who plan to graduate in August may attend commencement ceremonies in the preceding or subsequent May. Students graduating in December are invited to a special recognition ceremony in December and may also attend Commencement the following May. All academic work must be complete by the official conferral date in order to receive a degree on that date. Incomplete academic work will result in a later conferral date.

Honors

Notice: beginning with the December 2026 conferral date, Cornell University will institute a standardized Latin Honors system based solely on final cumulative undergraduate GPA. The Latin Honors categories include: Summa Cum Laude (top 5%), Magna Cum Laude (next 10%), and Cum Laude (next 15%).

The student's cumulative undergraduate GPA percentile at the time of degree conferral will be computed with respect to the student's particular college. Existing college-specific Latin Honors systems not based upon the new standardized criteria will be discontinued at the end of Summer 2026. This will apply to all major honors in Arts & Sciences as they will no longer use Latin Honors and will award "Honors in X" (e.g. Honors in Chemistry, Honors in English, etc.) Please see Graduation and Academic Honors for more information.

Bachelor of Arts with Honors

Almost all departments offer honors programs for students who have demonstrated exceptional accomplishment in the major and succeeded in research. The conferring of honors, and the requirements for conferral (cum laude, magna cum laude, or summa cum laude) are set by the departments for each major, the Independent Major Program, or the College Scholar Program. Minors do not offer honors programs. Students should contact the Director of Undergraduate Studies (https://as.cornell.edu/about/directors-undergraduate-study/) with questions about honors in the respective program.

Bachelor of Arts with Distinction

The degree of Bachelor of Arts with distinction in all subjects will be conferred on students who have completed the requirements for the degree of Bachelor of Arts, if they have met the following requirements by the end of their final semester:

1. completed at least 60 credits while registered in regular sessions at Cornell;
2. achieved a GPA in the upper 30 percent of their class at the end of the seventh semester, or next-to-last semester for transfers and accelerants;
3. received a grade below C– in no more than one course;
4. received no failing grade (excluding PE);
5. have no frozen Incompletes on their records; and
6. maintained good academic standing, including completing a full schedule of at least 12 academic credits, in each of their last four semesters. (Students who have been approved to have prorated tuition for their final semester are considered to be in good academic standing).