

LOGIC, INFORMATION, & COMPUTATION, BA

Modern mathematical logic began with work by Cantor, Frege, and other mathematicians during the last three decades of the nineteenth century who were concerned with providing a sound basis for the development of mathematical analysis. In the wake of "the crisis in the foundations of mathematics" precipitated by the discovery of various logical paradoxes at the turn of the twentieth century, mathematicians and philosophers such as Hilbert and Russell intensively pursued investigations into the logical foundations of mathematics. Connections between logic and the foundations of mathematics remained an important source for scientific developments in logic through the epochal results of Gödel in 1930 and 1931, which indicated both the scope and limits of the mechanization of mathematical reasoning. The great burst of scientific activity occasioned by Gödel's results led directly to Turing's mathematical characterization of mechanical computation in terms of simple devices, now known as Turing machines. The work of Gödel, Turing, and other logicians during the 1930s laid the scientific foundations for the revolution in computer and information technology that began in the last half of the twentieth century and continues today.

The Logic, Information, and Computation Program offers students the opportunity to engage in a systematic, integrative program of study within the School of Arts and Sciences. Logic remains one of the core disciplines in investigations of information and computation. Indeed, logic is playing a major role in advances in computer security, database technology, networking, and software engineering. Moreover, logic has expanded its role within mathematics beyond foundational studies and now enjoys rich connections with areas as diverse as algebra, analysis, and combinatorics. In light of the current importance of the investigation of computation and information from both a scientific and technological point of view, the Major and Minor in Logic, Information, and Computation will provide students with a strong background to pursue computational aspects of the natural, biological, and social sciences and prepare them for careers in information technology.

The minimum total course units (<https://www.college.upenn.edu/credits-needed-major/>) for graduation in this major is 36. Double majors may entail more course units.

For more information: <http://logic.sas.upenn.edu/program.html>

For information about the General Education requirements, please visit the College of Arts & Sciences Curriculum (<https://www.college.upenn.edu/curriculum/>) page.

Code	Title	Course Units
College General Education Requirements and Free Electives		
Foundational Approaches + Sectors ¹ + Free Electives		19
Major Requirements		
<i>Mathematics Requirement</i>		
MATH 1400	Calculus, Part I	1
MATH 1410	Calculus, Part II	1
MATH 2400	Calculus, Part III	1
MATH 3700	Algebra	1
	or MATH 5020 Abstract Algebra	
MATH 3710	Algebra	1

or MATH 5030 Abstract Algebra		
<i>Computer & Info Science Requirement</i>		
CIS 1200	Programming Languages and Techniques I	1
CIS 1210	Programming Languages and Techniques II	1
CIS 3200	Introduction to Algorithms	1
<i>Physics Requirement</i>		
PHYS 0150	Principles of Physics I: Mechanics and Wave Motion	1.5
PHYS 0151	Principles of Physics II: Electromagnetism and Radiation	1.5
<i>Logic, Info, & Computation Requirement</i>		
LGIC 2100/ MATH 3400	Discrete Mathematics I	1
LGIC 3100/ PHIL 4721/ MATH 5700	Logic and Computability 1	1
LGIC 2200/ MATH 3410	Discrete Mathematics II	1
LGIC 3200/ PHIL 4722/ MATH 5710	Logic and Computability 2	1
<i>Elective</i>		
Select 1 course unit of Elective ²		1
<i>Capstone Seminar</i>		
LGIC 4960	Topics in Mathematical Logic	1.0
Total Course Units		36

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You may count no more than one course toward both a Major and a Sector requirement. For Exceptions, check the Policy Statement (<http://www.college.upenn.edu/sectors-policy/>).

2

Check: <http://logic.sas.upenn.edu> for for pre-approved courses.

Honors

Applicants must have an overall GPA of 3.0 and a GPA of 3.5 in the Major. Senior research project required.

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2023 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.