



# Mathematics Major and Minor

[www.Mathematics.Pitt.edu](http://www.Mathematics.Pitt.edu)

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Mathematics has been described as the queen of the sciences. Mathematics is the language of quantitative information and structure. Quantitative information is acquired, classified, and processed according to mathematical models of physical phenomena with mathematical tools. There is a wide range of applications even of the most pure of mathematical disciplines. Cryptography is based on algebra, signal processing is based on Fourier analysis, and important applications from topology to physics exist as well. In our department, we offer unique research opportunities for undergraduates in mathematical biology, scientific computing, and financial mathematics as well as algebra, geometry, and analysis.

The Department of Mathematics offers bachelor degree programs in mathematics, applied mathematics, actuarial mathematics, and mathematical biology. We also offer a joint major in mathematics-economics. Each of the department's majors has its own philosophy and its own formal requirements. For additional information, visit the Department of Mathematics Web site.

## Required courses for the Mathematics major

The mathematics major requires the completion of 41 credits in mathematics distributed as follows.

### Calculus courses

MATH 0220 Analytic Geometry and Calculus 1  
MATH 0230 Analytic Geometry and Calculus 2  
MATH 0240 Analytic Geometry and Calculus 3

### Introductory theoretical courses

MATH 0413 Introduction to Theoretical Mathematics (W-course)  
MATH 0420 Introduction to Theory 1-Variable Calculus  
MATH 0430 Introduction to Abstract Algebraic Systems

### Professional Development

MATH 0500 Professional Development

### Upper-level required courses

#### Required course

MATH 1270 Ordinary Differential Equations 1

#### One of the following

MATH 1180 Linear Algebra 1  
MATH 1185 Honors Linear Algebra

#### One of the following

MATH 1020 Applied Elementary Number Theory  
MATH 1025 Introduction to Mathematical Cryptography  
MATH 1050 Combinatorial Mathematics  
MATH 1250 Abstract Algebra  
MATH 1310 Graph Theory

## Upper-level elective courses; choose three of the following courses

MATH 1020 Applied Elementary Number Theory  
MATH 1025 Introduction to Mathematical Cryptography  
MATH 1050 Combinatorial Mathematics  
MATH 1070 Numerical Mathematical Analysis  
MATH 1080 Numerical Linear Algebra  
MATH 1100 Linear Programming  
MATH 1101 Introduction to Optimization  
MATH 1110 Industrial Mathematics  
MATH 1250 Abstract Algebra  
MATH 1280 Ordinary Differential Equations 2  
MATH 1290 Topics in Geometry  
MATH 1310 Graph Theory  
MATH 1350 Introduction to Differential Geometry  
MATH 1360 Modeling in Applied Math 1  
MATH 1370 Computational Neuroscience  
MATH 1380 Mathematical Biology  
MATH 1410 Introduction to Foundations of Mathematics  
MATH 1470 Partial Differential Equations 1  
MATH 1510 Probability  
MATH 1530 Advanced Calculus 1  
MATH 1540 Advanced Calculus 2  
MATH 1550 Vector Analysis and Applications  
MATH 1560 Complex Variables and Applications  
MATH 1570 Transform Methods in Applied Math  
MATH 1700 Introduction to Topology  
MATH 1800 Advanced Topics in Mathematics  
MATH 2XXX, 3XXX any 3-credit graduate level course  
STAT 1631 Intermediate Mathematical Statistics 1  
STAT 1632 Intermediate Mathematical Statistics 2

### Physics course

PHYS 0174 Basic Physics for Science and Engineering 1

### Programming course; choose one

CS 0007 Introduction to Computer Programming  
CS 0008 Introduction to Computer Programming with Python  
CS 0010 Introduction to Computing for Systems Engineers  
CS 0011 Introduction to Computing for Scientists  
CS 0012 Introduction to Computing for the Humanities  
CS 0401 Intermediate Programming Using Java

### Recommended courses

Students interested in graduate study in mathematics are advised to take MATH 1530 and MATH 1540. Those interested in pursuing secondary education certification in mathematics are required to take MATH 1020, MATH 1230, and MATH 1290. MATH 1230 does not count toward the major.

### Grade requirements

A grade of C or better is required in each course that is to count toward the major. A minimum GPA of 2.0 in departmental courses is required for graduation.

### Satisfactory/No Credit option

Only MATH 0500 may be taken on an S/NC basis. All other courses must be taken on a letter grade basis.

### Writing (W) requirement

Students must complete at least one W-course in the major. MATH 0413 satisfies this requirement.

### Honors major requirements

Honors in mathematics is granted if the student:

- Completes these courses with a grade of B or better:
  - MATH 1250 Abstract Algebra
  - MATH 1530 Advanced Calculus 1
  - MATH 1540 Advanced Calculus 2
  - One 2000 level MATH course as an upper level elective;
- Completes an honors thesis under the direction of a member of the mathematics faculty or earns a grade of B or higher in a second 2000 level mathematics course in lieu of the honors thesis; and
- Completes all other requirements for the major.

### Advising

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### Checklist for the Mathematics major

#### Calculus courses

\_\_\_\_\_ MATH 0220  
\_\_\_\_\_ MATH 0230 / MATH 0235 (UHC)  
\_\_\_\_\_ MATH 0240

**Note:** MATH 0235 (UHC) can replace both MATH 0220 and MATH 0230.

#### Introductory theoretical courses

\_\_\_\_\_ MATH 0413  
\_\_\_\_\_ MATH 0420  
\_\_\_\_\_ MATH 0430

**Note:** Students who successfully complete MATH 0450 (UHC) are exempted from MATH 0420.

### Upper-Level Required Courses

#### One of the following

\_\_\_\_\_ MATH 1180  
\_\_\_\_\_ MATH 1185 (UHC)

#### Required course

\_\_\_\_\_ MATH 1270

#### One of the following

\_\_\_\_\_ MATH 1020                      \_\_\_\_\_ MATH 1250  
\_\_\_\_\_ MATH 1025                      \_\_\_\_\_ MATH 1310  
\_\_\_\_\_ MATH 1050

#### Professional Development

\_\_\_\_\_ MATH 0500

#### Upper-level elective courses

Three courses from the list on the front of this sheet

\_\_\_\_\_ MATH \_\_\_\_\_                      \_\_\_\_\_ STAT \_\_\_\_\_  
\_\_\_\_\_ MATH \_\_\_\_\_                      \_\_\_\_\_ STAT \_\_\_\_\_  
\_\_\_\_\_ MATH \_\_\_\_\_

#### Physics course

\_\_\_\_\_ PHYS 0174

#### Programming course; choose one

\_\_\_\_\_ CS 0007  
\_\_\_\_\_ CS 0008  
\_\_\_\_\_ CS 0010  
\_\_\_\_\_ CS 0011  
\_\_\_\_\_ CS 0012  
\_\_\_\_\_ CS 0401

### Checklist for the Mathematics minor

#### At least nine credits in MATH courses numbered 0250 or higher

\_\_\_\_\_ MATH \_\_\_\_\_ (0250 or higher)  
\_\_\_\_\_ MATH \_\_\_\_\_ (0250 or higher)  
\_\_\_\_\_ MATH \_\_\_\_\_ (0250 or higher)

#### At least six credits in MATH courses numbered 1000 or higher

\_\_\_\_\_ MATH \_\_\_\_\_ (1000 or higher)  
\_\_\_\_\_ MATH \_\_\_\_\_ (1000 or higher)

- Students may not count MATH 0400 toward the minor.
- Students may not count both MATH 0280 and MATH 1180 toward the minor.
- Students may not count both MATH 0290 and MATH 1270 toward the minor.

#### Grade requirements

A letter grade of C or higher is required in each course for completion of this minor. Students may not take any course for the minor on an S/NC basis.

**Note:** Students must apply for any official minor they will complete or have completed at the time they apply for graduation.