

Applied Mathematics Major

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 have arisen from topology to physics. Our department offers unique research opportunities for undergraduates in mathematical biology, scientific computing, and finance mathematics as well as algebra, geometry, and analysis.

The Department of Mathematics offers an ample selection of courses leading to a Bachelor of Science degree in mathematics, applied mathematics, and actuarial mathematics as well as various courses for non-majors. We also offer the possibility of joint majors in mathematics-economics and mathematics-philosophy (see separate sheets for joint majors). 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 Applied Mathematics major

The Applied Mathematics major requires the completion of 40 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
MATH 0420 Introduction to Theory 1-Variable Calculus

Upper-level required courses

MATH 1180 Linear Algebra 1 or 1185 Honors
MATH 1270 Ordinary Differential Equations 1 or 1275 Honors

One of the following numerical math courses

MATH 1070 Numerical Mathematical Analysis
MATH 1080 Numerical Linear Algebra
MATH 1100 Linear Programming
MATH 1101 Introduction to Optimization
MATH 1110 Industrial Mathematics

One of the following applied analysis courses

MATH 1550 Vector Analysis and Applications
MATH 1560 Complex Variables and Applications
MATH 1570 Transform Methods in Applied Math

One of the following differential equations courses or an

additional Numerical Math or Applied Analysis course
MATH 1280 Ordinary Differential Equations 2
MATH 1470 Partial Differential Equations 1
MATH 1480 Partial Differential Equations 2

One of the following

MATH 1110 Industrial Mathematics
MATH 1360 Modeling in Applied Math 1
MATH 1370 Computational Neuroscience
MATH 1380 Mathematical Biology

Physics courses

PHYS 0174 Basic Physics for Science and Engineering 1
PHYS 0175 Basic Physics for Science and Engineering 2

One Computer Science course

CS 0007 Introduction to Computer Programming in Java
CS 0008 Introduction to Computer Programming in Python
CS 0132 Programming in C
CS 0401 Intermediate Programming using Java

One Statistics course

MATH 1510 Mathematical Theory of Probability
STAT 1000 Introduction to Applied Statistics
STAT 1100 Statistics and Probability for Business Mgmt.
STAT 1151 Introduction to Probability

Recommended courses: Students interested in graduate study are strongly advised to take MATH 1530 and MATH 1540. These courses may be substituted for the Applied Analysis course and the Differential Equations course respectively. Students interested in pursuing secondary education certification in mathematics should take MATH 0430, MATH 1020, MATH 1230, and MATH 1290 in addition to the courses required for the major. These courses are required for secondary education certification in Pennsylvania and by the School of Education for admission to the MAT program in Mathematics Secondary Education.

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: No course that counts toward the major can be taken on an S/NC basis.

Writing (W) requirement: Students must complete at least one W-course in the major.

Related area: A minimum of 12 credits is required in any one of the Arts and Sciences departments listed on the right side of this sheet chosen in consultation with the major advisor.

Honors major requirements

Honors in Applied Mathematics is granted if the student:

1. Completes all other requirements for the major.
2. Completes the following courses with a grade of B or better:
 - a. MATH 1470
 - b. MATH 1530
 - c. MATH 1540
 - d. a 2000 level course in lieu of a 1000 level elective
3. Completes an honors thesis under the direction of a member of the mathematics faculty or completes a 2000-level course in lieu of the honors thesis.

Note: The statistics requirement is waived for students seeking honors in Applied Mathematics.

Advising: Jonathan Rubin
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Checklist for the Applied Mathematics major

Calculus courses

_____ MATH 0220
_____ MATH 0230 / MATH 0235
_____ MATH 0240

Introductory theoretical courses

_____ MATH 0413 / MATH 0450 *
_____ MATH 0420

* Students who successfully complete MATH 0450 are exempted from taking MATH 0420.

Upper level required courses

_____ MATH 1180 / MATH 1185
_____ MATH 1270 / MATH 1275

One numerical math course

_____ MATH 1070
_____ MATH 1080
_____ MATH 1100
_____ MATH 1101
_____ MATH 1110

One applied analysis course

_____ MATH 1550
_____ MATH 1560
_____ MATH 1570
_____ MATH 1530

One differential equations course

_____ MATH 1280
_____ MATH 1470
_____ MATH 1480

One of the following

_____ MATH 1110
_____ MATH 1360
_____ MATH 1370
_____ MATH 1380

Physics courses

_____ PHYS 0174 / PHYS 0475
_____ PHYS 0175 / PHYS 0476

One Computer Science course

_____ CS 0007
_____ CS 0008
_____ CS 0132
_____ CS 0401

One Statistics course

_____ MATH 1510
_____ STAT 1000
_____ STAT 1100
_____ STAT 1151

Approved Related Area departments and courses

Requests to use course sequences not included in these lists can be made by petition to the Undergraduate Director.

Chemistry*

_____ CHEM 0110 or
_____ CHEM 0710
_____ CHEM 0120 or
_____ CHEM 0720
_____ CHEM 0310 or
_____ CHEM 0730
_____ CHEM 0320 or
_____ CHEM 0740
_____ CHEM 0330
_____ CHEM 0345
_____ CHEM 1130
_____ CHEM 1410
_____ CHEM 1420
_____ CHEM 1430
_____ CHEM 1440
_____ CHEM 1450

Physics*

_____ PHYS 0174 or
_____ PHYS 0475
_____ PHYS 0175 or
_____ PHYS 0476
_____ PHYS 0477
_____ PHYS 0481
_____ PHYS 1321
_____ PHYS 1351
_____ PHYS 1372
_____ PHYS 1331
_____ PHYS 1341
_____ PHYS 1361
_____ PHYS 1370
_____ PHYS 1371
_____ PHYS 1373

Statistics*

_____ STAT 1151 +
_____ STAT 1152
_____ STAT 1000-level
_____ STAT 1000-level

Computer Science*

_____ CS 0008
_____ CS 0132
_____ CS 0401
_____ CS 0441
_____ CS 0445
_____ CS 0447
_____ CS 1501
_____ CS 1510
_____ CS 1515

Economics*

_____ ECON 0100
_____ ECON 0110
_____ ECON 0280
_____ ECON 1100
_____ ECON 1110
_____ ECON 1150
_____ ECON 1180
_____ ECON 1200

Engineering

Any major in an area of engineering will satisfy the related area requirement. Any sequence of 12 credits in a coherent area of engineering can be submitted to the Department of Mathematics for consideration as well.

* These departments offer official minors.

+ This course cannot be used for both the statistics course for the major and for the related area requirement.