University of Pittsburgh | Dietrich School

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 (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 38 credits in mathematics or as few as 31 with UHC (University Honors Course) options, plus 8 in Physics, at least 3 in Statistics, and 3 in Computer Science. They are distributed as follows.

Calculus courses
MATH 0220 Analytic Geometry and Calculus 1
MATH 0230 Analytic Geometry and Calculus 2
Note: Qualified students may substitute MATH 0235 Honors 1-Variable Calculus (UHC) for MATH 0220 and MATH 0230
MATH 0240 Analytic Geometry and Calculus 3

Professional Development
MATH 0500 Professional Development

Introductory theoretical courses
MATH 0413 Introduction to Theoretical Mathematics
MATH 0420 Introduction to Theory 1-Variable Calculus
Note: Qualified students may substitute MATH 0450 Introduction to Analysis (UHC) for MATH 0413 and MATH 0420

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 1101 Introduction to Optimization
MATH 1127 Predictive Analytics 2

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

One of the following courses
MATH 1103 Mathematical Problems in Business, Industry and Government
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 0010 Introduction to Computing for Systems Engineers
CS 0011 Introduction to Computing for Scientists
CS 0012 Introduction to Computing for the Humanities
CMPINF 0401 Intermediate Programming using Java

One Statistics course
MATH 1119 Applied Probability for Actuarial Mathematics
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 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

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.

Related area

A minimum of 12 credits of related coursework is required within the major. Eligible courses are list on the right side of this sheet and should be chosen in consultation with the major advisor.

Honors major requirements

Departmental Honors in Applied Mathematics is granted if the student:

Completes all other requirements for the major and:

- completes the following courses with a grade of B or better.
  - MATH 1470
  - MATH 1530
  - MATH 1540
  - a 2000 level course in lieu of a 1000 level elective
- 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

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Checklist for the Applied Mathematics major

Calculus courses

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

Professional Development

_____ MATH 0500

Introductory theoretical courses

_____ MATH 0413 / MATH 0450 *
_____ MATH 0420

* Students who successfully complete MATH 0450 are exempted from taking MATH 0413 and MATH 0420.

Upper level required courses

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

One numerical math course

_____ MATH 1070
_____ MATH 1080
_____ MATH 1101
_____ MATH 1127

One applied analysis course

_____ MATH 1550
_____ MATH 1560
_____ MATH 1570

One differential equations course

_____ MATH 1280
_____ MATH 1470

One of the following

_____ MATH 1360
_____ MATH 1370
_____ MATH 1380
_____ MATH 1103

Physics courses

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

One Computer Science course

_____ CS 0007
_____ CS 0008
_____ CS 0010
_____ CS 0011
_____ CS 0012
_____ CMPINF 0401

One Statistics course

_____ MATH 1119
_____ 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 / CHEM 0710
____ CHEM 0120 / CHEM 0720
____ CHEM 0310 / CHEM 0730
____ CHEM 0320 / CHEM 0740
____ CHEM 0330
____ CHEM 0345
____ CHEM 1130
____ CHEM 1410
____ CHEM 1420
____ CHEM 1430
____ CHEM 1440
____ CHEM 1450

Computer Science*
____ CS 0007
____ CS 0008
____ CS 0010
____ CS 0011
____ CS 0012
____ 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

Physics*
____ PHYS 0174 / PHYS 0475
____ PHYS 0175 / 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 1152
____ STAT 1151 +
____ STAT 1000-level
____ STAT 1000-level

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.