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 0500 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.
  o MATH 1470
  o MATH 1530
  o MATH 1540
  o 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
Jason DeBlois
THACK 407
UGDMath@Pitt.edu

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 1127
_______ MATH 1080
_______ MATH 1101
One applied analysis course
______ MATH 1550       _______ MATH 1570
______ MATH 1560

One differential equations course
______ MATH 1280       _______ MATH 1470

One of the following
______ MATH 1360       _______ MATH 1380
______ MATH 1370       _______ MATH 1103

Physics courses
______ PHYS 0174 / PHYS 0475
______ PHYS 0175 / PHYS 0476

One Computer Science course
______ CS 0007         _______ CS 0011
______ CS 0008         _______ CS 0012
______ CS 0010         _______ CMPINF 0401

One Statistics course
______ MATH 1119
______ MATH 1510       _______ STAT 1100
______ STAT 1000       _______ 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.

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<th>Chemistry*</th>
<th>Physics*</th>
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<td>______ CHEM 0110   / CHEM 0710</td>
<td>______ PHYS 0174 / PHYS 0475</td>
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<td>______ CHEM 0120   / CHEM 0720</td>
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<th>Computer Science*</th>
<th>Statistics*</th>
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<td>______ CS 0007</td>
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<th>Economics*</th>
<th>Engineering</th>
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<td>______ ECON 0100</td>
<td>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.</td>
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<td>______ ECON 1200</td>
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* These departments offer official minors.

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