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 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
- CS 0008 Introduction to Computer Programming in Python
- CS 0401 Intermediate Programming using Java

**One Statistics course**
- MATH 1510 Mathematical Statistics
- MATH 1530 Probability
- STAT 1000 Introduction to Applied Statistics
- 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 back 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
THACK 501
jonrubin@pitt.edu

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 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 0401

One Statistics course
   _______ MATH 1510
   _______ STAT 1000
   _______ STAT 1151

Approved Related Area departments and courses

Biological Sciences
   _______ BIOSC 0150 / BIOSC 0715
   _______ BIOSC 0050
   _______ BIOSC 0160 / BIOSC 0716
   _______ BIOSC 0060
   _______ BIOSC 0370
   _______ BIOSC 0390

Chemistry*
   _______ CHEM 0110 / CHEM 0710 / CHEM 0760 / CHEM 0960
   _______ CHEM 0120 / CHEM 0720 / CHEM 0770 / CHEM 0970
   _______ CHEM 0310 / CHEM 0730
   _______ CHEM 0330
   _______ CHEM 1410
   _______ CHEM 1430
   _______ CHEM 1450

Computer Science*
   _______ CS 0007
   _______ CS 0132
   _______ CS 0401
   _______ CS 0441
   _______ CS 0445
   _______ CS 1501
   _______ CS 1510
   _______ CS 1515

Economics*
   _______ ECON 0100
   _______ ECON 0110
   _______ ECON 0120 (in lieu of 0100 and 0110)
   _______ ECON 1100
   _______ ECON 1110
   _______ ECON 1150
   _______ ECON 1180
   _______ ECON 1200

Physics*
   _______ PHYS 0174 or 0475
   _______ PHYS 0175 or 0476
   _______ PHYS 0219 or 0577
   _______ PHYS 0368
   _______ PHYS 1119
   _______ PHYS 1120

* Note: These departments offer official minors.