

MATHEMATICS AND STATISTICS

Department Office: 919 Hunter East;
(212) 772-5300; fax (212) 772-4858

Chair: Ada Peluso

Dolciani Mathematics Learning Center;
300 Hunter North; (212) 772-5371

Web site: <http://math.hunter.cuny.edu>

Professors:

Baider, Basmajian, Bendersky, Cherkas, Churchill, Clarkson,
Croom, Loustau, Peluso, Roitberg, Shneerson, Thompson, Williams

Associate Professors:

Binkowski, Chess, Jambois, Shay

Assistant Professors: Draghicescu, Talih

Lecturers: Samra, Segarra

Advisers:

(undergraduate) Thomas Jambois,
(mathematics BA/MA, MA) John Loustau
(statistics) Edward Binkowski
(mathematics education) Rachael Welder

HEGIS Codes: 1701 (BA; BA/MA in Mathematics, Adolescent Education/Mathematics); 1701/1703 (BA/MA in Mathematics/Statistics and Applied Mathematics); 1702 (BA in Statistics); 1702/1703 (BA/MA in Statistics/Statistics and Applied Mathematics)

Majors Offered	Options in Major	Number Credits	Recommended/ Required GER	Prereq	Recommended Minor
BA in Mathematics	Traditional mathematics major for careers in business or government and for graduate study beyond the master's level	at least 33		MATH 150 and 155 or the equivalent	12 approved credits in one of the following subjects: biological sciences, chemistry, computer science, economics, geology, philosophy (in particular, logic), physics, or statistics; however, other minors may also be approved
BA in Mathematics	Concentration in Preparation for Adolescent Education (Grades 7-12)	at least 33	HIST 151 HIST 152 GEOG 101 (program prerequisites)	MATH 150 and 155 or the equivalent	The adolescent education sequence is taken in lieu of a minor.
BA in Mathematics	Concentration in Quantitative Biology (Bioinformatics) for students intending to pursue research careers in biomedical sciences.	60		MATH 150 and 155 or the equivalent; an average of B- or better in the following courses: STAT 213, CHEM 104-105 (or the equivalent), CHEM 222, BIOL 100. In addition, no more than one (1) of these four courses may be passed with a grade of C.	The following required natural science courses fulfill the requirements for a minor in biological sciences or in chemistry: CHEM 102-105 (or the equivalent), CHEM 222, BIOL 100, BIOL 300, BIOL 425.
BA in Mathematics	Concentration in Preparation for Childhood Education (Grades 1-6)	at least 32	HIST 151 HIST 152 GEOG 101 (program prerequisites)	MATH 150 or the equivalent	Childhood education, QUEST, serves as a collateral major, in place of a minor
BA in Statistics	Traditional statistics major for careers in the sciences and social sciences	32		MATH 150 and 155 or the equivalent	12 approved credits in one of the following subjects: biological sciences, chemistry, computer science, economics, geology, mathematics, philosophy (in particular, logic), physics, political science, psychology, or sociology
BA in Statistics	Concentration in Quantitative Biology (Bioinformatics) for students intending to pursue research careers in biomedical sciences	59		MATH 150 and 155 or the equivalent; an average of B- or better in the following courses: STAT 213, CHEM 104-105 (or the equivalent), CHEM 222, BIOL 100. In addition, no more than one (1) of these four courses may be passed with a grade of C.	The following required natural science courses fulfill the requirements for a minor in biological sciences or in chemistry: CHEM 102-105 (or the equivalent), CHEM 222, BIOL 100, BIOL 300, BIOL 425.

Majors Offered	Options in Major	Number Credits	Recommended/ Required GER	Prereq	Recommended Minor
BA/MA Programs					
Accelerated BA/MA in Mathematics		Minimum of 120 total			Students complete the BA with a traditional major in mathematics with 30 additional credits at the graduate level in pure mathematics that are approved by the departmental graduate adviser
Accelerated BA/MA in Mathematics/Statistics and Applied Mathematics		Minimum of 120 total			Students complete the BA with a traditional major in mathematics, with 30 additional credits at the graduate level in applied mathematics, statistics and computer science that are approved by the departmental graduate adviser
Accelerated BA/MA in Statistics/Statistics and Applied Mathematics		Minimum of 120 total			Students complete the BA with a traditional major in statistics or mathematics, with 30 additional credits at the graduate level in applied mathematics, statistics and computer science that are approved by the departmental graduate adviser
BA/MA in Preparation for Adolescent Education (Grades 7-12)		Minimum of 141 total			The program includes 50 credits in mathematics courses and 23 credits in teacher education courses

The Department of Mathematics and Statistics offers majors in mathematics and statistics that prepare students for careers in business, government, research and teaching. Students considering such majors should consult an adviser during their first or second semester to plan the proper sequence of courses and should continue to consult the adviser at least once each semester. Minors in mathematics and statistics are also offered. Students are reminded that requirements to complete a minor are determined by the major department.

Credit and Course Exemption The department offers credit or course exemption based on standard examinations such as AP. Inquiries should be made at the department office.

MATHEMATICS PROFICIENCY AND PLACEMENT

Effective fall 2004, all students entering Hunter College must demonstrate proficiency (mastery of basic skills) in mathematics as evidenced by scoring 27 or greater on each of the pre-algebra and algebra parts of the new COMPASS math test. Certain categories of students are exempt from this requirement. See the Testing Requirements section of this catalog or check with the Testing Office for more information. Subsequent placement into all mathematics and statistics courses is determined by the student's score on the remaining parts of this exam. New students entering the college take this test in its entirety when they take the other placement exams in reading and writing. Continuing students at the college who have already taken parts 1 and 2 of the formerly used CUNY five-part math exam must take the algebra, college algebra and trigonometry parts of the new COMPASS math exam before registering for a course above MATH 100. A testing schedule and information about the math exam are available from the Testing Office, Room 150 Hunter North, 772-4898. The schedule for this examination should be checked well in advance of registration.

Passing specific parts of this examination is now required by various other departments for entry into certain courses. Requests for information about other departments' regulations should be directed to those departments.

HONORS

A student majoring in mathematics or statistics may become a candidate for departmental honors by successfully completing MATH 490, by presenting a major GPA of at least 3.6 and by achieving a satisfactory rating on a comprehensive examination.

MATHEMATICS MAJOR

The mathematics major introduces students to the fundamental areas of mathematics and provides some degree of specialization in one or more areas. It trains students in the analytic thinking characteristic of pure and applied mathematics and provides some familiarity with rigorous methods of mathematical proof. In addition to the traditional mathematics major, described below, the department offers a number of specialized tracks: a concentration in preparation for adolescent education (grades 7-12), a concentration in quantitative biology, a concentration in preparation for childhood education (grades 1-6) and a BA/MA program in preparation for adolescent education (grades 7-12).

To enter the traditional mathematics major (for careers in business or government and for graduate study beyond the master's level), the student should have completed one year of calculus (MATH 150 and 155, or the equivalent). The major consists of at least 33 credits of coursework: 24 credits of core curriculum courses taken by all mathematics majors except those enrolled in the concentration in preparation for childhood education (grades 1-6) or enrolled in the BA portion of the BA/MA program in prepara-

tion for adolescent education (grades 7-12) and at least 9 credits of advanced elective courses, chosen by students according to their career plans.

Students interested in pursuing mathematics at the advanced graduate level are urged to participate in the BA/MA program in mathematics. The BA/MA program in preparation for adolescent education leads to professional (permanent) certification in adolescent education (grades 7-12) in mathematics. Permanent certification may also be received by completing the BA degree with a mathematics major and then completing the graduate Teacher Education Program (TEP) in Mathematics or the graduate Teaching Opportunity Program (TOP) in Mathematics.

Major Core Curriculum (24 cr)

MATH 156, 250, 254, 255, 260, 311, 351 and STAT 213 or 311.

Elective Courses

The student must complete three 3-credit approved elective courses. The elective courses must be chosen from the 300- or 400-level courses in mathematics or statistics listed by the department. Factors affecting the choice of courses will include the student's career goals (preparation for graduate study; education; careers in business, government service or industry), the student's other major, where applicable, (for students with a second major in mathematics), and the availability of courses due to the course rotation schedule. A 300-level course may be replaced by a graduate level course approved by a departmental adviser.

Symbolic Computation Proficiency Requirement

As a requirement for graduation with a BA in mathematics, students must demonstrate entry level proficiency in symbolic computation. The requirement can be met in any of the following ways:

- a) passing any of MATH 126, MATH 151, MATH 154, MATH 385;
- b) passing a departmental exam in a computer algebra system (currently we use MATHEMATICA or the equivalent)

MINOR

Except for mathematics majors planning to teach in elementary or secondary schools, majors in mathematics ordinarily take as a minor 12 approved credits in one of the following subjects: biological sciences, chemistry, computer science, economics, geology, philosophy (in particular, logic), physics, or statistics. However, other minors may also be approved. Students following the concentration in quantitative biology must take the following natural science courses, which will fulfill the requirements for a minor in biological sciences or in chemistry: CHEM 102-105 (or the equivalent), CHEM 222, BIOL 100, BIOL 300, BIOL 425. For students preparing to teach in elementary or secondary schools the education sequence as prescribed by the School of Education is taken in lieu of a minor.

Minor for Non-Majors

Non-majors wishing to minor in mathematics should consult their major adviser for appropriate course recommendations.

Concentration in Preparation for Adolescent Education (Grades 7-12)

Provisional certification for teaching mathematics in grades 7-12 may be obtained by completing a BA with a traditional mathematics major and the adolescent education sequence as prescribed by the School of Education. This education sequence is taken in lieu of a minor. Students following this concentration in the mathematics major should consult a departmental adviser as to which advanced elective courses are recommended to complete 33 or more credits in the major.

Concentration in Quantitative Biology (in the Mathematics Major)

This program is for students intending to pursue research careers in biomedical sciences. It provides students with a working knowledge of computing and biological sciences for bioengineering careers in bioinformatics, the pharmaceutical industry, and the biotechnology industry. In order to enroll in the quantitative biology concentration within the mathematics major, students must obtain an average of B- or better in the following courses: STAT 213, CHEM 104-105 (or the equivalent), CHEM 222, BIOL 100. In addition, no more than one (1) of these four courses may be passed with a grade of C.

The requirements for the mathematics major that also apply to the bioinformatics concentration are the entry requirements MATH 150 and MATH 155, the symbolic computation proficiency requirement and the major core curriculum:

(24 cr) MATH 156, 250, 254, 255, 260, 311, 351 and STAT 213 or 311.

Required courses (in addition to the major core) are: STAT 311 or STAT 213, STAT 319, CSCI 132, CSCI 232.

Students will also take the following natural science courses, which will fulfill the requirements for a minor in biological sciences or in chemistry: CHEM 102-105 (or the equivalent), CHEM 222, BIOL 100, BIOL 300, BIOL 425.

Concentration in Preparation for Childhood Education (Grades 1-6)

This concentration constitutes a mathematics major for QUEST students. QUEST students majoring in mathematics are not exempt from the MATH 104/MATH 105 requirement. To enter the mathematics major, the student should have completed one semester of calculus (MATH 150 or the equivalent). The specified collateral major is childhood education. No minor is required. The mathematics major consists of at least 32 credits of coursework: 20 credits of major core curriculum courses and at least 12 additional credits, as described below.

(20 cr core): MATH 154, 155, 156, 160, 250, 260, and STAT 213.

At least 12 additional credits are required for the major. These are: STAT 212, STAT 220, and two additional courses approved by a departmental adviser.

BA/MA PROGRAM in PREPARATION for ADOLESCENT EDUCATION (GRADES 7-12)

Students interested in secondary school teaching may pursue a combined BA/MA program in teaching. This program requires a minimum of 141 credits.

Admission Requirements for the BA/MA in Teaching:

1. Completion of at least 45 credits with a GPA of 2.8
2. Completion of at least 10 credits in mathematics, including a year of calculus (MATH 150 and 155, or the equivalent), with an average of 2.7 in these major courses.

Degree Requirements for the BA/MA in Teaching

The BA/MA program in the teaching of mathematics includes 50 credits in mathematics and 23 credits in teacher education courses, some of them taken at the undergraduate level and some at the graduate level. The required mathematics courses are:

1. The following 23 undergraduate credits: MATH 150, 155, 156, 250, 260, 311, STAT 213
2. The following 15 graduate credits: MATH 620, 623 or 634, 630, 661, STAT 614

3. 12 additional credits in mathematics or statistics at the 200-level or above, selected with the approval of the departmental mathematics education adviser.

The student should consult the School of Education section of the graduate college catalog for the sequence of teacher education courses.

STATISTICS MAJOR

The study of statistics provides the student with analytical tools that may find application in various fields within the sciences and social sciences. Bioinformatics is a rapidly developing area open to students in statistics with a working knowledge of computing and biological sciences. Actuarial science is one area open to students in statistics who also have backgrounds in such subjects as computer science, mathematics and economics.

The MA in statistics and applied mathematics offered by the department provides enrichment for undergraduate statistics majors. To enter the major the student must have completed MATH 150 and 155. Normally, the statistics major consists of 32 credits as follows: 29 credits of core curriculum courses and any additional 3-credit statistics, mathematics, or computer science course approved by the undergraduate statistics adviser. Modifications are permitted with the consent of the statistics adviser. For example, a student may elect to replace STAT 212 with a more advanced course. With permission of the adviser, a student may take graduate courses in the MA in statistics and applied mathematics program. Students interested in bioinformatics take the additional courses listed in the concentration in quantitative biology below.

Major Core Curriculum

(29 cr) MATH 250, 254 or 354, 260, STAT 212, 213, 214, 311, 312, 313

Minor

Statistics majors take 12 approved credits as a minor in one of the following subjects: biological sciences, chemistry, computer science, economics, geology, mathematics, philosophy (in particular, logic), physics, political science, psychology or sociology. For information concerning approved minor sequences, students should consult the departmental adviser. Students following the concentration in quantitative biology must take the following natural science courses, which will fulfill the requirements for a minor in biological sciences or in chemistry: CHEM 102-105 (or the equivalent), CHEM 222, BIOL 100, BIOL 300, BIOL 425.

Minor for Non-Majors

Non-majors wishing to minor in statistics should consult their major adviser for appropriate course recommendations.

Actuarial Sequence

Students interested in actuarial work should take MATH 150, 155, 250, 260, STAT 311 and 313. Students are also encouraged to take courses in accounting, economics and computer science. For information concerning examinations and prizes given to undergraduates by the Society of Actuaries, consult the departmental adviser.

Concentration in Quantitative Biology (in the Statistics Major)

For students intending to pursue research careers in biomedical sciences. This is a new option to provide students with a working knowledge of computing and biological sciences for bioengineering careers in bioinformatics, the pharmaceutical industry, and the biotechnology industry. Required courses (in addition to the core): CSCI 132, CSCI 232. In order to enroll in the concentration in quantitative biology within the statistics major, students must obtain an average of B- or better in the following courses: STAT 213, CHEM 104-105 (or the equivalent), CHEM 222, BIOL 100. In addition, no more than one (1) of these four courses may be passed with a grade of C.

ACCELERATED BA/MA PROGRAM in MATHEMATICS or in STATISTICS and APPLIED MATHEMATICS

The BA/MA program offers promising students the opportunity to complete both the bachelor's and master's degree requirements with a minimum of 120 credits. Requirements are the same as those for a major in the department, plus 30 credits at the graduate level. Interested students should contact the graduate adviser for further information regarding eligibility and curriculum requirements.

Track 1: BA/MA Program in Mathematics

Students complete the BA with a traditional mathematics major, with 30 additional credits at the graduate level in pure mathematics approved by the departmental graduate adviser.

Track 2: BA/MA Program in Statistics and Applied Mathematics

Students complete the BA with a traditional major in statistics or mathematics, with 30 additional credits at the graduate level in applied mathematics, statistics and computer science approved by the departmental graduate adviser.

COURSE LISTINGS

In planning their schedules, prospective majors should note that some advanced required courses are offered only once each year and several advanced elective courses are offered only once every other year. A rotation schedule for course offerings is available in the department office and on the departmental web site.

Prerequisites: Because of the nature of mathematics, the department recommends that students refrain from enrolling in any course that carries prerequisites unless these prerequisites have been completed with a grade of C or better.

MATHEMATICS

MATH 100 Basic Structures of Mathematics GER 1/B

Not open to students who have received credit for any math or stat course that satisfies the GER 1/B requirement. Not recommended for students majoring in mathematics, statistics, computer science, or natural sciences. Symbolic logic, sets, number systems, relations and operations and topics in probability and statistics. This course is a terminal course and does not serve as a prerequisite to any other course in the department
3 hrs, 3 cr.

MATH 101 Algebra for College Students

Topics in algebra, graphing and functions. Includes: algebraic and graphical solutions to systems of equations and inequalities; absolute value, polynomial, rational and radical expressions and equations; complex numbers; the function concept; introduction to polynomial, rational and exponential functions and their graphs.
*prereq: appropriate score on placement exam
4 hrs (2 lec, 2 lab), 3 cr.*

MATH 104 Mathematics for Elementary Education I GER 1/B

Fundamental and relevant mathematics as recommended by the NCTM for prospective elementary school teachers, including problem solving, sets, logic, numeration, computation, integers and number theory. Required of students planning to teach in elementary schools. Not open to other students.

*prereq: MATH 101 or appropriate score on the placement exam
3 hrs, 3 cr.*

MATH 105 Mathematics for Elementary Education II GER 1/B

Continuation of MATH 104. Continuation of the content of the mathematics recommended by the NCTM for prospective elementary school teachers, including probability, statistics, plane and transformatonal geometry, congruence and similarity.

*prereq: MATH 104
3 hrs, 3 cr.*

MATH 110 Topics in the Mathematical Sciences GER 1/B

Not open to students who have completed MATH 105, 160 or 260. Intended for liberal arts or social science students. Applications of topics selected from algebra, analysis, computer science, geometry, probability and statistics.

*prereq: college-level mathematics or statistics course
3 hrs, 3 cr.*

MATH 111 Matrices, Vectors and Linear Programming GER 1/B

Not open to students who have completed MATH 160 or 260. Recommended for accounting students; not recommended for students majoring in mathematics or statistics. Introduction to matrices and vectors, systems of linear equations and linear programming with applications.

*prereq: MATH 101 or appropriate score on placement exam
3 hrs, 3 cr.*

MATH 125 Precalculus GER 1/B

Functions and their graphs: polynomial, rational, exponential, logarithmic and trigonometric functions; conic sections; topics in trigonometry; graphical and analytical solutions to systems of equations and inequalities. Not credited to students who have completed MATH 150 or its equivalent.

*prereq: grade of C or better in MATH 101 or appropriate score on placement exam
4 hrs, 4 cr.*

MATH 126 Precalculus Technology Laboratory

Students are introduced to MATHEMATICA as a tool for exploring qualitative features of functions and solving precalculus problems: simplifying algebraic expressions, solving equations, plotting functions and curves, finding and approximating zeros and solving systems of equations. MATH 126 cannot be taken for credit after a student has passed MATH 150. Students who have passed MATH 150 should register for MATH 154 to satisfy the symbolic proficiency requirement.

*prereq: grade of C or better in MATH 101 or appropriate score on placement exam
pre- or coreq: MATH 125
2 hrs, 1 cr.*

MATH 150 Calculus with Analytic Geometry I GER 1/B

Limits, continuity, differentiation and integration of elementary functions and trigonometric functions, applications. It is strongly recommended that students who have not taken MATH 126 register for MATH 154 simultaneously with MATH 150. For majors in mathematics, MATH 154 may be used to satisfy the departmental graduation requirement of proficiency in symbolic computation.

*prereq: grade of C or better in MATH 125 or appropriate score on placement exam
4 hrs, 4 cr.*

MATH 151 Calculus I with Symbolic Computation

Combines MATH 150 (Calculus I) with MATH 154. Some previous experience with computers is desirable but not required.

*prereq: grade of C or better in MATH 125 or appropriate score on placement exam
6 hrs, 5 cr.*

MATH 154 An Introduction to Symbolic Computation

Laboratory introduction to machine-aided computation with an emphasis on examples related to calculus. Students use a symbolic computation package to investigate and solve problems numerically, analytically and graphically. The same package is used to create reports of their results. Some previous experience with computers is desirable but not required.

*pre- or coreq: MATH 150
2 hrs, 1 cr.*

MATH 155 Calculus with Analytic Geometry II

Differentiation and integration of transcendental functions, integration techniques, infinite sequences and series, improper integrals, polar coordinates.

*prereq: MATH 150
4 hrs, 4 cr.*

MATH 156 Introduction to Mathematical Proof Workshop

Techniques of proof will be introduced, among them the direct and indirect methods of proof, epsilon-delta arguments and induction. These will be applied to theorems in number theory, set theory and in differential and integral calculus.

*prereq: MATH 150
pre- or coreq: MATH 155
2 hrs, 1 cr.*

MATH 160 Matrix Algebra

Systems of linear equations, matrices, determinants, introduction to vector spaces and linear transformations, applications.

*prereq: MATH 125 or appropriate score on placement exam
3 hrs, 3 cr.*

MATH 250 Calculus with Analytic Geometry III

Vector geometry, dot and cross products, partial derivatives, matrices, determinants, Jacobians, multiple integration.

*prereq: MATH 155
4 hrs, 4 cr.*

MATH 254 Ordinary Differential Equations

First-order equations, second-order linear equations and linear systems, power series solutions, transform and numerical methods, introduction to qualitative theory.

*prereq: MATH 250
3 hrs, 3 cr.*

MATH 255 Vector Analysis

Line and surface integrals, Green's Theorem, divergence theorem, Stokes' Theorem, generalized coordinates.

*prereq: MATH 250
3 hrs, 3 cr.*

MATH 260 Linear Algebra

Vector spaces, linear transformations, canonical forms, inner product spaces, bilinear forms, applications.

*prereq: MATH 156 or perm dept.
pre- or coreq: MATH 250
4 hrs, 4 cr.*

MATH 261W Mathematics in Human History

A historical treatment of themes in mathematics, probability and statistics, with applications in the arts and sciences. Roots of mathematics in non-Western cultures and contributions of women and minorities are included.

*prereqs: ENGL 120, college-level mathematics course beyond MATH 101
3 hrs, 3 cr.*

MATH 275 Intermediate Symbolic Logic

Symbolization of statements in sentential and predicate notation, sentential derivations, interpretations, predicate derivations through logic of identity and definite descriptions. Cross-listed as PHIL 275.

*prereqs: MATH 156
3 hrs, 3 cr.*

MATH 295 Intermediate Topics in Mathematics

May be repeated as topics vary, but not more than twice. Topics to be studied in any given term will be announced prior to registration.

*prereqs: MATH 150; additional prereqs depend on specific course offered
3 hrs, 3 cr.*

MATH 301 Mathematical Methods for the Physical Sciences

The solution of linear partial differential equations and boundary value problems. Solution techniques such as separation of variables, Fourier series, Green's functions and Laplace transforms are covered. These are applied to several equations which occur in physical applications such as the heat equation, the Laplace equation and the wave equation. Crosslisted as PHYS 301.

*prereq: MATH 254
3 hrs, 3 cr.*

MATH 311 Abstract Algebra I

Introduction to the theory of groups and rings.

*prereq: MATH 260
3 hrs, 3 cr.*

MATH 312 Abstract Algebra II

Elements of Galois theory, construction with ruler and compass, advanced topics in ring theory and linear algebra.

*prereq: MATH 311
3 hrs, 3 cr.*

MATH 313 Theory of Numbers

Congruences, quadratic residues, elementary Diophantine analysis, continued fractions, sums of squares.

*prereq: MATH 260
3 hrs, 3 cr.*

MATH 331 Geometries

Topics in affine and projective geometry and/or topics in differential geometry.

*prereq: MATH 260
3 hrs, 3 cr.*

MATH 340 Topology

Metric and topological spaces, continuity, homeomorphisms, compactness, connectedness, homotopy, fundamental group.

*prereq: MATH 351
3 hrs, 3 cr.*

MATH 351 Mathematical Analysis I

Rigorous treatment of foundations of calculus, including topology of real line and higher dimensional spaces. Basic results on continuous functions.

*prereqs: MATH 156, 250, 260
3 hrs, 3 cr.*

MATH 352 Mathematical Analysis II

Integration, sequences and series, uniform convergence, differentiation of functions of several variables, inverse and implicit function theorems, formula for change of variables.

*prereq: MATH 351
3 hrs, 3 cr.*

MATH 353 Introduction To Complex Variables

Complex numbers, analytic functions, elementary functions, contour integrals, Cauchy integral theory, series.

*prereqs: MATH 156, 255
3 hrs, 3 cr.*

MATH 354 Dynamical Systems and Chaos

Linear flows, qualitative theory of low-dimensional nonlinear systems, introduction to chaos in discrete one-dimensional dynamical systems.

*prereqs: MATH 250, 260
3 hrs, 3 cr.*

MATH 370 Mathematical Logic

A survey of the central results and techniques of metalogic, principally mathematical induction, the soundness and completeness of theorems for first-order logic, the Skolem Theorem and Church's Theorem on undecidability. Cross-listed as PHIL 375.

*prereq: MATH 260 or perm instr.
3 hrs, 3 cr.*

MATH 371 Fundamental Concepts of Modern Mathematics
GER 3/B

Axiomatic approach to set theory: axiom of choice, Zorn's Lemma, transfinite arithmetic.

prereqs: two of the following: MATH 260, 311, 351, 352
3 hrs, 3 cr.

MATH 376W Philosophy of Mathematics
GER 3/B

Study of such issues as the nature of demonstration or proof and the nature of mathematical knowledge and mathematical objects such as numbers and sets. Cross-listed as PHIL 376.

prereqs: ENGL 120; one PHIL course; second course in PHIL or MATH (precalculus or beyond)
3 hrs, 3 cr.

MATH 385 Numerical Methods I
GER 3/B

Accuracy and precision, convergence, iterative and direct methods. Topics selected from: solution of polynomial equations and linear systems of equations, curve fitting and function approximation, interpolation, differentiation and integration, differential equations.

prereq: MATH 250 and MATH 260 or permission of the instructor.
3 hrs, 3 cr.

MATH 391, 392, 393 Independent Study in Mathematics
GER 3/B

Open to Jr/Sr only. Independent study and reading under direction of faculty member.

prereq: perm dept.
1-3 hrs, 1-3 cr.

MATH 395 Advanced Topics in Mathematics
GER 3/B

Topics to be studied in any given term will be announced prior to registration. May be repeated as topics vary, but not more than twice.

prereqs: MATH 250, 260; additional prereqs depend on specific course offered
3 hrs, 3 cr.

MATH 454 Calculus on Manifolds
GER 3/B

Functions on Euclidean space, implicit function theorem, Fubini's Theorem, integration on chains and manifolds.

prereq: MATH 352
3 hrs, 3 cr.

MATH 485 Numerical Methods II
GER 3/B

Advanced topics in numerical solutions to partial differential equations, finite element method, von Neumann stability analysis, finite difference method. Examples from computational fluid dynamics and structural mechanics.

prereq: MATH 385
3 hrs, 3 cr.

MATH 490 Honors Seminar
GER 3/B

prereqs: MATH 311, 351, perm dept.
3 hrs, 3 cr.

STATISTICS

STAT 113 Elementary Probability and Statistics
GER 1/B

Not open to students who have completed STAT 213 or PSYC 248. Not credited for majors in statistics or mathematics unless minor is elementary education. An introduction to applied statistics and statistical computing. Hands-on data analysis. Graphical inference. The five number summary, box plots, scatterplots, normal probability plots. Elementary probability. Statistical estimation and hypothesis testing. Linear regression. Students are expected to analyze real data sets and write reports. Students who have taken calculus or place into calculus by the placement exam should take STAT 213 instead of STAT 113.

prereq: MATH 101 or appropriate score on placement exam; pre or co-req: ENGL 120.
3 hrs, 3 cr.

STAT 212 Discrete Probability
GER 1/B

Combinatorics, discrete probability, random walks and game theory. Emphasis on model building.

prereq: MATH 125 or appropriate score on placement exam
3 hrs, 3 cr.

STAT 213 Introduction to Applied Statistics
GER 1/B

Familiarity with the Windows computing environment encouraged. Sampling, estimation, tests of hypotheses, including one- and two-sample t-tests, two- and three-way tables for nominal and ordinal data, linear regression, analysis of variance through two-way with interaction, appropriate statistical software.

prereq: MATH 125 or appropriate score on placement exam. Familiarity with the Windows computing environment encouraged.
3 hrs, 3 cr.

STAT 214 Data Analysis Using Statistical Software
GER 3/B

Familiarity with the Windows computing environment encouraged. Analysis of variance, simple and multiple regression, nonparametric statistics, statistical model building.

prereqs: STAT 213 or MATH 125 and STAT 113 with grade of C or better in each course
3 hrs, 3 cr.

STAT 220 Statistical Analysis in Forensics

A second course in probability and statistics and the evaluation of evidence in the forensic sciences.

Prereq: STAT 212 and either STAT 213 or 113 by permission of instructor. One of the above, i.e., STAT 212 or STAT 213 or STAT 113 by permission of instructor may be taken as a coreq.
3 hrs, 3 cr.

STAT 295 Intermediate Topics in Statistics
GER 3/B

Topics to be studied in any given term will be announced prior to registration. May be repeated as topics vary, but not more than twice.

prereqs: STAT 213 or STAT 113 and MATH 125; additional prereqs depend on specific course offered
3 hrs, 3 cr.

STAT 311 Probability Theory
GER 3/B

Combinatorics, distribution theory for discrete and continuous random variables, central limit theorems.

prereq: MATH 250
3 hrs, 3 cr.

STAT 312 Stochastic Processes
GER 3/B

Discrete and continuous stochastic processes including Markov chains, birth processes, queues and Brownian motion.

prereq: STAT 311
3 hrs, 3 cr.

STAT 313 Introduction to Mathematical Statistics
GER 3/B

Estimation, hypothesis testing, confidence limits for normal, binomial, Poisson and exponential random variables.

prereq: STAT 311
3 hrs, 3 cr.

STAT 351 Advanced Biometrics
GER 3/B

A second course in statistics covering quantitative methods applicable in the life sciences. Topics include experimental design, life table analysis, ethical issues, survival analysis, logistic regression and Cox regression. Linear algebra recommended but not required.

prereqs: math at level of MATH 125, STAT 113, 213 or equiv. intro. statistics course
3 hrs, 3 cr.

STAT 391 Independent Study
GER 3/B

Open to Jr/Sr majors only. Independent study in which a student selects a topic of interest to him or herself. The study is carried out under the direction of a faculty member.

1 hr, 1 cr.

STAT 392 Independent Study
GER 3/B

Open to Jr/Sr majors only. Independent study in which a student selects a topic of interest to him or herself. The study is carried out under the direction of a faculty member.

2 hrs, 2 cr.

STAT 393 Independent Study
GER 3/B

Open to Jr/Sr majors only. Independent study in which a student selects a topic of interest to him or herself. The study is carried out under the direction of a faculty member.

3 hrs, 3 cr.

STAT 395 Advanced Topics in Statistics
GER 3/B

Topics to be studied in any given term will be announced prior to registration. May be repeated as topics vary, but not more than twice.

prereqs: STAT 311; STAT 312 or 313; additional prereqs depend on specific course offered
3 hrs, 3 cr.

STAT 486 Elements of Visualization

The structure and purpose of visualization systems; includes fully developed examples from statistics and applied mathematics. Final project required.

prereq: MATH 385 (CSCI 385, PHYS 385) or all of MATH 160, MATH 250 and STAT 213
3 hrs, 3 cr.