DIVISION OF
NATURAL SCIENCE
AND MATHEMATICS

Mathematics

In addition to the courses below, students in the Mathematics major are also required to take the following General Education courses (see pages 54-58).

ENG 106 Argumentative Writing
ENG 107 Academic Writing
ENG 208 Sophomore Core – Social Responsibility
ECN 200 Introduction to Economics (0.5 c.u.)
MTH 114 Precalculus
AAC course Arts as Catalyst (1 c.u.)
HUM GELS Humanities GELS (2 c.u.s)
CAT/HUM GELS (1 c.u.) Creative Arts & Technology GELS or Humanities GELS
SOC SCI GELS Social Science GELS (2 c.u.s)
General Education Electives (2 c.u.s)

Many courses have prerequisites which are listed in the course description. Please be sure that necessary prerequisites have been taken before enrolling in any course.

Students wishing New Jersey Teaching Certification must be admitted into the B.A. in Education and satisfy the courses listed in the Mathematics co-concentration (see page 145). Should a student decide to major in the discipline exclusively, he/she will need to submit a change of major declaration and satisfy all the requirements listed below. Students who wish to double major must complete the requirements of both majors.

Bloomfield College offers a BS degree in Applied Mathematics.

The required courses are:

MTH 200 Applied Statistics I
MTH 221 Calculus & Analytic Geometry I
MTH 222 Calculus & Analytic Geometry II
MTH 223 Calculus & Analytic Geometry III
MTH 310 Number Theory
or
MTH 332 Discrete Mathematics
MTH 320 Differential Equations
MTH 330 Geometry
MTH 331 Foundations of Mathematics
MTH 337 Linear Algebra
MTH 415 Abstract Algebra
MTH 423 Advanced Calculus
CMP 100 Computer Literacy*
CMP 126 Programming I
CMP 226 Programming II
PHY 210 University Physics I
PHY 211 University Physics II

*This course may be substituted by a combination of

CMP 102 Fundamental Computer Literacy I (0.5 c.u.)
and
CMP 104 Fundamental Computer Literacy II (0.5 c.u.)

MINOR IN MATHEMATICS

Students electing a minor in Mathematics must take the following courses:

MTH 200 Applied Statistics I
MTH 221 Calculus & Analytic Geometry I
MTH 222 Calculus and Analytic Geometry II
MTH 310 Number Theory
or
MTH 332 Discrete Mathematics
MTH 320 Differential Equations
MTH 331 Foundations of Mathematics
MTH 337 Linear Algebra

Mathematics Courses

■ **General Education Course (Primary Competency Addressed)**

MTH 103 UNDERSTANDING OUR QUANTITATIVE WORLD

The ability to interpret data in order to make decisions is central to this course. Gaining information from data sets such as opinion polls and market research are integral to informing many life or business decisions. An understanding of descriptive statistics, describing data contained in tables and graphs, counting methods, an understanding of commercial uses of mathematics, and basic algebraic concepts including graphing both by hand and using computer programs such as Excel will aid the student to make such decisions. 1 c.u.
Prerequisite: ACF 94 or sufficient score on placement test.

MTH 105 ABSTRACT REASONING

A continuation of the basic algebra contained in ACF 94 with the concept of function as a central theme. Student will use multiple representations (literal, symbolic, and graphical) to represent functions and concepts. Polynomial, rational, exponential and logarithmic functions are considered. Right triangle trigonometry will be introduced. Methods to find solutions to systems of systems of two and three linear equations and an introduction to matrices are also contained in this course. 1 c.u.
Prerequisite: ACF 94 or sufficient score on placement test.

MTH 106 MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS

A course designed to develop an understanding of the mathematical concepts supporting topics taught at the elementary level. Central to these is the number sense required to teach basic operations (addition, subtraction, multiplication and division) with non-negative integers. Fractions, decimals, mental calculation and estimation are also considered. Students will use visualization, diagrams, manipulatives, and engaging in mathematical conversation to explore alternative ways of understanding and communicating required concepts. 1 c.u.
Prerequisite: ACF 92.
This course does not satisfy the mathematics requirement of the General Education Core.

MTH 114 PRECALCULUS

A study of the properties elementary functions as a unifying theme. Functions include linear, quadratic, polynomial, absolute value, rational, exponential, logarithmic, and trigonometric. Graphing of functions in the coordinate plane, finding zeros and intercepts, maximum or minimum values, applications of right angle trigonometry to solve triangles, the development of identities including half and double angle formulae, solving identities, Laws of Sines and Cosines to solve oblique triangles are considered. An introduction to the properties and uses of matrices, instruction in the use of the TI-83plus graphing calculator and expressing and calculating with real numbers in scientific notation are included. 1 c.u.
Prerequisite: ACF 94 or sufficient score on placement test.

MTH 200 APPLIED STATISTICS I

This course covers the methodology of organizing, summarizing, and presenting statistical data. Students calculate and interpret the measures of central tendency and dispersion and are introduced to probability and distribution theory (Normal, Binomial, Poisson). They use distribution and sampling theory to make statistical inferences. 1 c.u.
Prerequisite: MTH 105 or consent of the Instructor.

MTH 221 CALCULUS AND ANALYTIC GEOMETRY I

Basic theory of differential calculus through the concepts of limits and continuity are the goals of this course. Necessary analytic geometry is developed as required. Algebraic and trigonometric functions, curve sketching and applications to real world problems (including maximum/minimum problems), The Mean Value Theorem, and its consequences are covered. 1 c.u.
Prerequisite: MTH 114 with a grade of C or higher.

MTH 222 CALCULUS AND ANALYTIC GEOMETRY II

This is an introduction to the integral calculus and its application to the solution of real world problems. Integration of exponential, logarithmic and trigonometric functions, techniques of integration, and an introduction to differential equations are covered. 1 c.u.
Prerequisite: MTH 221.

MTH 223 CALCULUS AND ANALYTIC GEOMETRY III

The study of calculus is continued through sequences and series, multivariable functions and their derivatives, multiple integrals and vector valued functions, Green's Theorem, and Stokes' Theorem. Applications using the graphing calculator are included. 1 c.u.
Prerequisite: MTH 222.

MTH 310 NUMBER THEORY

This is a formal study of the integers through prime numbers, divisibility, congruencies, Euler's function and quadratic reciprocity. 1 c.u.
Prerequisite: MTH 222.

MTH 320 DIFFERENTIAL EQUATIONS

The focus of this course is the solution of differential equations. Topics include: separation of variables, homogeneous equations, integrating factors, linear and higher order equations and applications via classical and computer based methods. 1 c.u.
Prerequisite: MTH 222.

MTH 330 GEOMETRY

This is an axiomatic approach to geometry which compares various analyses of Euclid's fifth postulate resulting in non-Euclidian geometries. Several finite geometries are studied. 1 c.u.
Prerequisite: MTH 222.

MTH 331 FOUNDATIONS OF MATHEMATICS

This is a study of the development of concepts and tools used in abstract mathematics. Emphasis is on writing proofs, logic, set theory, formal axiom systems, and the real number system from an axiomatic point of view. 1 c.u.
Prerequisite: MTH 222.

MTH 332 DISCRETE MATHEMATICS

Topics in this course include: elementary set theory, permutations and combinations, discrete functions, relations and graphs, trees, counting procedures and Boolean Algebra. Application of these topics in computer science will be covered. 1 c.u.
Prerequisite: MTH 105.

MTH 337 LINEAR ALGEBRA

This is a course in the abstract mathematics sequence. Topics include: systems of linear equations, matrices, vectors, linear transformations, bases, linear independence, orthogonality, eigenvectors and eigenvalues. 1 c.u.
Prerequisite: MTH 331.

MTH 415 ABSTRACT ALGEBRA

This is the final course in the abstract mathematics sequence. Topics include: groups, rings, fields, integral domains, isomorphisms, homomorphisms, sub group structure of finite groups. 1 c.u.
Prerequisite: MTH 337.

MTH 423 ADVANCED CALCULUS

This course is a rigorous treatment of the basic concepts of calculus including limits, continuity, differentiation, and the Riemann integral. Properties of the real number system, and extensions of the Mean Value Theorem are also considered. 1 c.u.
Prerequisite: MTH 223.