Mathematics

Karl Konrad, Chair; Watson L. Chin, Murray Cox

AIMS OF THE PROGRAM
First, we aim to give each student an understanding of basic mathematics and its application to solving problems expressible by algebraic equations and inequalities. Second, we aim to train students to understand the fundamental concepts of mathematics so that they can teach the subject on the elementary or secondary level. Third, we aim to give a solid foundation in the area of mathematics which will prepare students to pursue further studies in mathematics, the physical sciences, economics, and the engineering sciences. Fourth, we aim to train students with marketable skills in biostatistics for the competitive job market in our technological society.

PROGRAMS
B.A. Mathematics - 30 hours (18 u.d.)
B.S. Mathematics - 36 hours (24 u.d.)
B.S. Mathematical Physics - 52 hours (30 u.d.)
Minor in Mathematics - 18 hours (6 u.d.)
Teaching Areas - Secondary Certification

Mathematics, B.A.
MATH 181 Calculus I ....................................................... 4
MATH 282 Calculus II ....................................................... 4
MATH 283 Calculus III ....................................................... 4
MATH 321 Differential Equations ........................................ 3
MATH 341 Geometry ........................................................... 3
MATH 361 Introduction to Linear Algebra .................................. 3
MATH 431 Modern Algebra .................................................. 3
MATH Electives (upper division) .................................. 3
TOTAL 30

Mathematics, B.S.
MATH 181 Calculus I ....................................................... 4
MATH 282 Calculus II ....................................................... 4
MATH 283 Calculus III ....................................................... 4
MATH 321 Differential Equations ........................................ 3
MATH 341 Geometry ........................................................... 3
MATH 361 Introduction to Linear Algebra .................................. 3
MATH 411 Numerical Analysis ............................................. 3
MATH 431 Modern Algebra .................................................. 3
MATH 451 Statistical Analysis .............................................. 3
MATH 471 Advanced Calculus ............................................ 3
MATH 431 Modern Algebra .................................................. 3
MATH Electives (upper division) .................................. 3
TOTAL 36

Required cognate: CSIS 110 or equivalent.

Mathematics Minor
MATH 181 Calculus I ....................................................... 4
MATH 282 Calculus II ....................................................... 4
MATH 283 Calculus III ....................................................... 4
MATH Electives (upper division) .................................. 6
TOTAL 18

Mathematical Physics, B.S.
MATH 181 Calculus I ....................................................... 4
MATH 282 Calculus II ....................................................... 4
MATH 283 Calculus III ....................................................... 4
MATH 321 Differential Equations ........................................ 3
MATH 361 Introduction to Linear Algebra .................................. 3
MATH 381 Complex Variables ............................................. 3
MATH 411 Numerical Analysis ............................................. 3
MATH 431 Modern Algebra .................................................. 3
MATH 451 Statistical Analysis .............................................. 3
MATH 471 Advanced Calculus ............................................ 3
PHYS 121 General Physics .................................................. 4
PHYS 122 General Physics .................................................. 4
PHYS 221 General Physics with Calculus .................................. 1
PHYS 222 General Physics with Calculus .................................. 1
PHYS 311 Modern Physics .................................................. 3
PHYS 322 Classical Mechanics ............................................. 3
PHYS 351 Electromagnetic Fields ........................................... 3
PHYS 411 Quantum Mechanics ............................................ 3
TOTAL 52
TEACHING CERTIFICATION PROGRAM

The following mathematics major and minors are for teaching certification only. Requirements for certification are listed in the Education section of this bulletin.

You must make formal application for admittance to the Teacher Education Program. Applications are available at the Education Department office.

Mathematics, B.S. - Secondary Teaching Area
MATH 181 Calculus I ................................................. 4
MATH 241 Intro to Probability & Statistics ......................... 3
MATH 282 Calculus II .................................................. 4
MATH 283 Calculus III ................................................. 4
MATH 321 Differential Equations .................................... 3
MATH 341 Geometry ...................................................... 3
MATH 361 Introduction to Linear Algebra .......................... 3
MATH 381 Complex Variables (3) ...................................
MATH 471 Advanced Calculus (3) .................................. 3

Choose two from the following:
MATH 361 Introduction to Linear Algebra .......................... 3
MATH 411 Numerical Analysis ....................................... 3
MATH 431 Modern Algebra .......................................... 3
MATH 451 Statistical Analysis ....................................... 3

TOTAL                                                                   26

Mathematics Minor - Secondary Teaching Area
Option II
MATH 121 Precalculus .................................................. 3
MATH 181 Calculus I ................................................. 4
MATH 241 Intro to Probability & Statistics ......................... 3
MATH 282 Calculus II .................................................. 4
MATH 341 Geometry ...................................................... 3
MATH 361 Introduction to Linear Algebra .......................... 3

Choose two from the following:
MATH 381 Complex Variables (3)
MATH 431 Modern Algebra (3)
MATH 451 Statistical Analysis (3) ..................................

TOTAL                                                                   36

MATH 011 Introduction to Algebra 3 hours
The course reviews algebra of the real number system, concepts of elementary set theory, rules of exponents with integer exponents, roots of real numbers, arithmetic of rational numbers and rational expressions, factorizing whole numbers into prime factors, factoring polynomials in one variable with integer coefficients into irreducible factors relative to the set of integers, solve linear equations and linear inequalities, solve applied problems which can be modeled by linear equations or linear inequalities.

A student must take this course if he or she needs a review of elementary algebra, or scored a 1 on the MPT. Each class meets five times a week with the instructor. This course does not apply toward general education or graduation requirements. (Fall, Spring)

MATH 012 Intermediate Algebra 3 hours
Prerequisite: Grade of C or higher in MATH 011 or MPT score of 2.
The course reviews algebra of the real number system, rules of exponents with rational exponents, factoring polynomials in one variable with integer coefficients into irreducible factors relative to the set of integers, solve linear and quadratic equations and inequalities, graph functions, solve applied problems which can be modeled by linear or quadratic equations or linear inequalities.

A student must take this course if he or she needs a review of algebra, or scored 2 on the math placement test. Each class meets five times a week with the instructor. This course does not apply toward general education or graduation requirements. (Fall, Spring)

MATH 101 Mathematics for Liberal Arts 3 hours
Prerequisite: MPT score of 3 or higher or at least a C in MATH 012.
Introduction to sets, Venn diagrams, truth tables, applications of Venn diagrams to logic, logical arguments, probability, sample spaces, permutations, combinations, statistics, averages, normal distributions, the metric system, measurement, consumer interest, and loans. (Fall)

MATH 110 College Algebra 3 hours
Prerequisite: MPT score of 4 or higher or at least a C in MATH 012.
College Algebra is a study of equations, inequalities, certain classes of functions (polynomial, rational, exponential, and logarithmic), and their graphs and systems of equations. (Fall, Spring)

MATH 121 Precalculus 3 hours
Prerequisite: MPT score of 5 or MATH 110.
A study of polynomials, rational, exponential, logarithmic, and trigonometric functions and their graphs and conic sections. (Fall)

MATH 181 Calculus I 4 hours
Prerequisite: MATH 121 or its equivalent.
A study of algebraic and transcendental function of one variable, limits, continuity, differentiation, and integration, and application of integrals. Writing assignments are an essential part of the course. (Spring)
MATH 236 Applied Mathematics for Business 3 hours
Prerequisite: MATH 110 or 121.
The study of mathematical tools necessary to make effective business decisions. Areas of study include: linear equations, linear programming, probabilities, optimization, and functions. (Spring)

MATH 241 Intro. to Probability & Statistics 3 hours
Prerequisite MPT score of 4 or higher or MATH 110.
This course introduces elementary probability, statistical inference, and applications to business and science. (Fall, Spring)

MATH 282 Calculus II 4 hours
Prerequisite: MATH 181.
A study of transcendental functions and differential equations, techniques of integration, infinite series, and vectors in two-dimensional and polar coordinates. Writing assignments are an essential part of the course. (Fall)

MATH 283 Calculus III 4 hours
Prerequisite: MATH 282.
A study of the calculus of several variables, vectors and motion in space, derivatives and integration of functions of several variables. Writing assignments are an essential part of the course. (Spring)

MATH 291 Selected Topics 1 hour
Prerequisite: Approval by department chair.
Designed for the student who wishes to do independent study or research. Content and method of study must be arranged prior to registration. May be repeated for a total of 2 credits.

MATH 321 Differential Equations 3 hours
Prerequisite: MATH 283.
This is a study of ordinary differential equations with emphasis on the analytic methods for solving them. (Offered periodically)

MATH 341 Geometry 3 hours
Prerequisite: MATH 282.
This course is a study of Euclidean and non-Euclidean geometry. Two research papers are required for the course. Possible subjects for papers are: proofs of a theorem outside of the class, history of geometry, biographies of somebody who made geometry, etc. This course meets the upper division writing component for senior year English. (Offered periodically)

MATH 361 Introduction to Linear Algebra 3 hours
Prerequisite: MATH 283.
An introduction to vector spaces and matrix theory over the field of real numbers. (Offered periodically)

MATH 381 Complex Variables 3 hours
Prerequisite: MATH 283.
This course is a study of analytic functions, power series, calculus of residues, and conformal mappings. (Offered periodically)

MATH 411 Numerical Analysis with Application 3 hours
Prerequisite: MATH 283, 321; knowledge of some computer programming language.
This is a course in numerical methods for solving mathematical problems. The writing of computer programs for solving problems is a part of the course. (Offered periodically)

MATH 431 Modern Algebra 3 hours
Prerequisite: MATH 361.
A study of the abstract systems: groups, rings, fields, and integral domains. (Offered periodically)

MATH 451 Statistical Analysis 3 hours
Prerequisite: MATH 282.
A study of the basic ideas of probability theory, discrete and continuous random variables, and their distributions, with application to statistics. (Offered periodically)

MATH 471 Advanced Calculus 3 hours
Prerequisite: MATH 283.
This is a study of functions of one real variable, and the conditions for differentiability and for integrability of these functions. Emphasis is placed on proving theorems. (Offered periodically)

MATH 491 Selected Topics 1-3 hours
Prerequisite: Approval by department chair.
Designed for the student who wishes to do independent study or research. Content and method of study must be arranged prior to registration. May be repeated for a total of 3 credits.