HOWARD PAYNE UNIVERSITY

THE SCHOOL OF SCIENCE & MATHEMATICS

MATHEMATICS

OVERVIEW

The purpose of the School of Science and Mathematics is to provide programs and coursework to students in the fields of science, engineering, technology, and mathematics. The school also contributes course offerings for HPU's liberal arts and sciences general education curriculum. Undergraduate degrees are offered in the areas of biology, biomedical engineering, biomedical science, chemistry (with concentrations in biochemistry and forensic science), computer information systems, engineering science, information systems management, mathematics and software engineering.

COURSES DESCRIPTIONS

MAT 1101-4609: Special Studies

Special courses not a part of the regular schedule, offered on an irregular schedule.

MAT 1332: Contemporary Mathematics (Mathematics For Liberal Arts)

Contemporary Mathematics is a survey course for non-STEM majors which includes introductory treatments of number sense, logic, algebraic concepts, geometric concepts, financial mathematics, probability, statistics, and graph theory. Fall, Spring.

MAT 1351: College Algebra

A course designed to meet the general education mathematics requirement for any BA or BS degree offered at HPU. Topics studied include data analysis, modeling, complex numbers, special equations and inequalities, functions, polynomial and rational functions, exponential and logarithmic functions, matrices, and determinants. Fall, Spring, Summer.

MAT 1431: Foundations Of Algebra

A conceptual approach to the study of basic computations of whole numbers, fractions, and integers. Additional topics studied: algebraic expressions and equations; exponents; polynomial arithmetic; factoring polynomials; systems of equations. This course prepares students for College Algebra. (Developmental course - elective credit only; does not satisfy the mathematics requirement for any degree.) Fall, Spring.

MAT 1371: Mathematics For Elementary Teachers I
Problem solving, sets, number systems, mathematical systems, natural numbers, real and complex numbers are studied. This course requires two hours per week of mathematical laboratory. Required for elementary teacher certification. Fall.

MAT 2342: Introduction To Probability And Statistics
A beginning course studying frequency distributions, probability, binomial and normal distributions, random sampling, testing hypothesis, confidence intervals, and other topics as time permits. Fall, Spring.

MAT 2343: Statistics
Topics include frequency distributions, graphs, measures of location and variation, the binomial and normal distributions, confidence intervals, z-test, one and two sample t-test, F-test, Chi-Square probability, correlation, covariance, regression, ANOVA. A student project is required for this course. Spring.

MAT 2345: Pre-Calculus Mathematics
Topics discussed include trigonometric functions, solutions of right and oblique triangles, logarithms, identities, trigonometric equations, polar coordinates, graphical interpretation of the equations of plane curves, straight lines, conic sections, parametric equations, introduction to analytical geometry, sequences series, mathematical induction, and the binomial theorem will be discussed in this course. Fall, Spring, Summer.

MAT 2347: Discrete Mathematics
This course provides an introduction to topics in logic, set theory, algorithms, recursion, relations, graphs, and trees. It also exposes students to mathematical proofs and abstract thinking. The course is designed for mathematics or computer information systems majors. Fall.

MAT 2445: Accelerated Pre-Calculus
Topics covered include Functions and Their Graphs, Polynomial and Rational Functions, Exponential and Logarithmic Functions, Trigonometry, Matrices and Determinants, Sequences and Series, and Topics in Analytics Geometry. Fall. Note: If the student's high school Pre-AP Pre-Calculus or AJP Calculus grade is B or higher the student should be in Calculus I MAT 2451.

MAT 2451: Calculus I
Topics covered include limits, differentiation, applications of differentiation, basic integration, and the Fundamental Theorem of Calculus, and applications of integration. Utilizes an online homework, quiz, and practice program including a study plan to improve student learning. Fall, Spring.

MAT 2461: Calculus II
Topics covered include exponential, logarithmic and other transcendental functions, integration techniques, improper intervals, infinite sequences and series, power series, and parametric and polar equations. Utilizes an online homework, quiz, and practice program including a study plan to improve student learning. Spring.

MAT 3302: Matrix And Linear Algebra
An introduction to matrices and vectors, applications of matrices including solutions of systems of linear equations. Also, an introduction to vector spaces, algebraic structures, linear transformations and characteristic values. Fall.

MAT 3311: Abstract Algebra
Introduction to number theory, groups, rings, integral domains, fields, isomorphisms, and the characterization of the integers and real numbers. Spring, even years.

MAT 3321: Mathematics For Elementary Teachers II
Basic concepts of geometry including the metric system and measurement, logic, probability and statistics. This course requires two hours per week of mathematics laboratory. Required for elementary teacher certification. Spring.

MAT 3322: Geometry
Development of Euclidean and non-Euclidean geometry by theoretical and intuitive methods. Recommended for all prospective secondary teachers. Spring, odd years.

MAT 3361: Calculus III
Topics covered include parametric equations, polar coordinates, vectors, surfaces in space, multivariable calculus, multiple integrations, and other topics as time permits. Fall.

MAT 3381: Mathematics For Secondary Teachers
An examination of the major topics of secondary and middle school mathematics curriculum in light of the National Council of Teachers of Mathematics Standards. Techniques to implement the standards through the use of manipulatives, graphing

calculators, computer technology, and projects will be explored. This course is required for the secondary and middle school teaching field in mathematics. Spring, odd years.

MAT 3451: Differential Equations
Differential Equations is a course covering solutions and applications to the more common types of ordinary differential equations, especially those of first and second order, with emphasis on geometrical and physical interpretation. Other topics include LaPlace Transforms, Initial Value Problems, Eigen Values, Eigen Vectors, and Solutions of Systems of Differential Equations. Spring.

MAT 4101: Mathematics Capstone
This course serves as a review of undergraduate level mathematics, preparing students for the MFT in Mathematics. Students will propose, research and present an independent project. Fall.

MAT 4181. TExES REVIEW
This course is required of those who will be clinical teaching. This course is designed to help students pass the Texas Examination of Educator Standards (TExES) for education students in their respective major Fall.

MAT 4200: Foundations Review And Assessment
Topics included are overviews of the three foundational topics (Calculus; Algebra and Geometry; Differential Equations and Analysis) for graduates in mathematics. Required assessments include unit exams for each of the foundational units, an essay articulating the importance of a chosen foundational course, and a standardized assessment of all foundational topics. Spring.

MAT 4351: Real Analysis
An axiomatic approach to the real numbers, sequences, functions, continuity, derivatives, integrals, series, and uniform convergence. Spring, even years.

MAT 4361: Complex Analysis
A study of complex numbers, analytic functions, exponential, trigonometric, and logarithmic functions of a complex variable, complex integration, Laurent Series, and residue theory. Fall, even years.

MAT 4441: Applied Probability And Statistics For Engineering And Mathematics
Descriptive statistics, discrete and continuous probability distributions, Central Limit Theorem, inferential statistics, regression, and correlation analysis, with emphasis on engineering applications. Spring.

MAT 4371: Introduction To Numerical Analysis
Error propagation, algorithms for solutions of equations in one variable, interpolation, numerical integration, and algorithms for solutions of differential equations (as time permits). Two hours of lecture and two hours of laboratory per week. Fall, odd years.