# MATHEMATICS

**MATH 160 Functions, Trigonometry, and Linear Systems** **4 Credits**
Grade Mode: Standard Letter, Audit/Non Audit

**MATH 161 Engineering Mathematics I** **4 Credits**
Grade Mode: Standard Letter, Audit/Non Audit
Prerequisite(s): MATH 160 or Math Placemnet Exam with a score of 22, Passing placement test; MATH 160

This course delves into advanced calculus topics essential for mathematical analysis and problem-solving. Students explore vectors, parametric equations, and vector functions, along with inverse trigonometric functions. Derivatives are extensively covered, including polynomial, exponential, trigonometric, and logarithmic functions, employing rules like product, quotient, and chain rules. Additionally, applications like exponential growth, related rates, and optimization are addressed. Integration techniques, including definite and indefinite integrals, are studied, alongside their applications in areas, distances, and the fundamental theorem of calculus. Emphasis is placed on understanding concepts deeply and applying them to real-world scenarios. Prerequisites: Passing placement test; MATH 160.

**MATH 162 Engineering Mathematics II** **4 Credits**
Grade Mode: Standard Letter, Audit/Non Audit
Prerequisite(s): MATH 161, MATH 161

This course provides a comprehensive exploration of advanced calculus concepts and techniques. Topics include integration methods like the Substitution Rule and integration by parts, along with applications such as finding areas between curves and volumes using various methods. Sequences, series, and convergence tests are covered, alongside power series and Taylor/Maclaurin series. Calculus in polar coordinates, including curves, areas, lengths, and conic sections, is also introduced. Emphasis is on mastering these concepts and applying them to real-world problems, preparing students for advanced mathematical analysis. Prerequisite: MATH 161.

**MATH 261 Engineering Mathematics III** **3 Credits**
Grade Mode: Standard Letter, Audit/Non Audit
Prerequisite(s): MATH 162, MATH 162

This course covers advanced multivariable calculus and vector analysis. Topics include vectors in 3D, equations of lines and planes, vector functions, and space curves. Students study derivatives and integrals of vector-valued functions, exploring concepts like arc length and curvature. Functions of several variables, including partial derivatives, are examined, with applications like tangent planes and gradients. Integration techniques cover double and triple integrals, coordinate systems, and variable changes. Line and surface integrals, along with fundamental theorems such as Green's, Stokes', and Divergence, are introduced, highlighting applications in physics and engineering. Prerequisite: MATH 162.

**MATH 318 Differential Equations** **3 Credits**
Grade Mode: Standard Letter, Audit/Non Audit
Prerequisite(s): MATH 261, MATH 261

This course provides a comprehensive exploration of differential equations and their applications. Topics include direction fields, solution methods such as separation of variables and Laplace transforms, and classification of equations. Students analyze linear and nonlinear equations, autonomous equations, and systems of equations. Techniques for solving homogeneous and nonhomogeneous equations, including mechanical and electrical applications, are covered. Special focus is placed on Laplace transforms for solving initial value problems and convolution integrals. Additionally, numerical methods like Euler's method and Runge-Kutta method are introduced for approximating solutions. Emphasis is on understanding theoretical concepts and applying them to diverse real-world scenarios. Prerequisite: MATH 261.

**MATH 321 Topics in Applied Mathematics** **3 Credits**
Grade Mode: Standard Letter, Audit/Non Audit
Prerequisite(s): MATH 261

This course offers a comprehensive study of linear algebra and its applications Topics include solving systems of linear equations using Gaussian elimination and matrix operations, along with determinants and their properties Students delve into vector spaces, subspaces, and linear transformations, exploring concepts such as rank, nullity, and change of basis Eigenvalues, eigenvectors, and diagonalization are covered extensively, alongside orthogonal projections and least squares methods. Additionally, the course introduces inner product spaces, orthogonalization techniques, and applications like Green's theorem and Stokes' theorem Emphasis is on understanding theoretical concepts and their practical applications in various fields including physics, engineering, and computer science.