MATHEMATICS (MTH)

Division: Mathematics, Engineering Technologies and Computer Sciences (METCS) Division

MTH 086 Introductory Algebra (4.5 Credits)
This beginning mathematics course is designed to take students from concrete arithmetic ideas to the more abstract algebraic forms of these ideas. Throughout the course, emphasis is placed on the development of arithmetic and algebraic skill and the application of these skills and concepts to the solution of practical problems. Topics covered include simplifying arithmetic and algebraic expressions, signed numbers, fractions, decimals, percents, radicals, estimations and geometric applications.
Pre-requisites: Decl Test Accept MTH086/ENG085 with a score of 901 or Elig. for Mth 086 with a score of 912 or
Co-requisites: MTH 086T

MTH 086T Tutorial (1 Credit)
Co-requisites: MTH 086

MTH 091S Basic Skills-Statistics & Prob (1.5 Credits)
In this course, algebraic concepts introduced in MTH 086, such as simplifying variable expressions and solving first-degree equations in one variable, are fully developed. In addition, the algebra curriculum is extended to include simplifying square roots, solving linear inequalities, and solving literal equations, Linear equations and their graphs as well as various problem-solving applications are also covered.
Pre-requisites: (Companion Arithmetic with a score of 69 and Companion Elementary Algebra with a score of 48 or Arithmetic (Next-Gen) with a score of 260 or Bilingual Computation with a score of 20) or Essex Math Placement with a score of 10 or MTH 086 with a minimum grade of C
Co-requisites: MTH 101

MTH 092 Elementary Algebra (4.5 Credits)
In this course, algebraic concepts introduced in MTH 086, such as simplifying variable expressions and solving first-degree equations in one variable, are fully developed. In addition, the algebra curriculum is extended to include operations on polynomials, rational expressions, and exponential expressions as well as solving quadratic equations, rational equations, and literal equations. Linear equations and their graphs as well as various problem solving applications are also covered. Calculators cannot be used in this course.
Pre-requisites: ((Essex Math Placement with a score of 10) or (Companion Arithmetic with a score of 069 and Companion Elementary Algebra with a score of 048) or Arithmetic (Next-Gen) with a score of 260 or Bilingual Computation with a score of 20 or MTH 086 with a minimum grade of C or AFM 083 with a minimum grade of C or Move Up Math 086 with a score of P or MTH 086 Summer Bridge with a score of P or TRANSFERRED COLLEGE LEVEL MATH with a score of 898 or Elig. for Math 100,101,103 with a score of 905 or Pre-reg. COLG math waiver only with a score of 908 or SAT/ACT Elig for Mth 100 with a score of 994) or COLLEGE DEGREE with a score of 988 or SAT/ACT Elig Eng101 Mth100 with a score of 995 or Transf. Eng 101 Mth 100 with a score of 999 or Elig. for Mth 092 with a score of 911 or Elig. for Eng 098 Mth 092 with a score of 919
Co-requisites: MTH 092T

MTH 092T Tutorial (1 Credit)
Co-requisites: MTH 092

MTH 093S Basic Skills for Modern Mathem (1.5 Credits)
In this course, the algebraic concepts that are introduced in MTH 086 are developed further. The topics include evaluating square roots, simplifying algebraic expressions, translating English phrases into algebraic expressions, solving linear equations and their applications, as well as graphing linear equations in the rectangular coordinate system.
Pre-requisites: Essex Math Placement with a score of 10 or (Companion Arithmetic with a score of 69 and Companion Elementary Algebra with a score of 48 or Arithmetic (Next-Gen) with a score of 260 or Bilingual Computation with a score of 20)
Co-requisites: MTH 103

MTH 100 Intro. to College Mathematics (4 Credits)
This course covers topics including special products, factoring, and other operations on polynomials, rational and radical expressions, integral and rational exponents, and scientific notation. In addition, analytic and graphical methods of solving linear equations, linear systems, literal equations, and elementary polynomial equations are covered. Students are also introduced to the analytic geometry of functions, including lines, circles, and parabolas. Diverse applications are emphasized throughout the course.
Pre-requisites: ((Companion Arithmetic with a score of 069 and Companion Elementary Algebra with a score of 076) or Essex Math Placement with a score of 12 or (Arithmetic (Next-Gen) with a score of 260 and Quant,Algebra,Stats(Next-Gen) with a score of 260) or (Bilingual Computation with a score of 20 and Bilingual Algebra with a score of 19) or MTH 092 with a minimum grade of C or Move Up Math 092 with a score of P or MTH 092 Summer Bridge with a score of P or TRANSFERRED COLLEGE LEVEL MATH with a score of 898 or Elig. for Math 100,101,103 with a score of 905 or Pre-reg. COLG math waiver only with a score of 908 or SAT/ACT Elig for Mth 100 with a score of 994) or COLLEGE DEGREE with a score of 988 or SAT/ACT Elig Eng101 Mth100 with a score of 995 or Transf. Eng 101 Mth 100 with a score of 999

MTH 101 Statistics and Probability I (4 Credits)
This course provides introduction to the basic ideas and methods of collecting, representing and analyzing data to report findings using elementary techniques from statistics and probability. Topics include the following: frequency distributions; histograms and frequency polygons; measures of central tendency and variability; conditional probability; percentiles; Z-scores; normal and binomial distributions, confidence intervals; hypothesis testing; regression and correlation.
Pre-requisites: ((Companion Arithmetic with a score of 069 and Companion Elementary Algebra with a score of 076) or (Essex Math Placement with a score of 10 or (Arithmetic (Next-Gen) with a score of 260 and Quant,Algebra,Stats(Next-Gen) with a score of 260) or (Bilingual Computation with a score of 20 and Bilingual Algebra with a score of 19) or (Companion Arithmetic with a score of 69 and Companion Elementary Algebra with a score of 48 or Arithmetic (Next-Gen) with a score of 260 or Bilingual Computation with a score of 20) or MTH 092 with a minimum grade of C or Move Up Math 092 with a score of P or MTH 092 Summer Bridge with a score of P or TRANSFERRED COLLEGE LEVEL MATH with a score of 898 or Elig. for Math 100,101,103 with a score of 905 or Pre-reg. COLG math waiver only with a score of 908 or SAT/ACT Elig for Mth 100 with a score of 994) or COLLEGE DEGREE with a score of 988 or SAT/ACT Elig Eng101 Mth100 with a score of 995 or Transf. Eng 101 Mth 100 with a score of 999

MTH 103 Fund Concepts Modern Math I (4 Credits)
This survey course covers fundamental concepts in Mathematics. An emphasis is placed on illustrating the impact of mathematics as a historical cultural force. Topics are chosen from logic, set theory, mathematical systems, number theory, algebra, geometry, and probability and statistics. Diverse applications are emphasized throughout the course.
Pre-requisites: Essex Math Placement with a score of 10) or (Companion Arithmetic with a score of 069 and Companion Elementary Algebra with a score of 076) or (Arithmetic (Next-Gen) with a score of 260 and Quant,Algebra,Stats(Next-Gen) with a score of 260) or (Bilingual Computation with a score of 20 and Bilingual Algebra with a score of 19) or MTH 092 with a minimum grade of C or (Companion Arithmetic with a score of 69 and Companion Elementary Algebra with a score of 46) or Arithmetic (Next-Gen) with a score of 260 or Bilingual Computation with a score of 20 or Move Up Math 092 with a score of P or MTH 092 Summer Bridge with a score of P or TRANSFERRED COLLEGE LEVEL MATH with a score of 898 or Elig. for Math 100,101,103 with a score of 905 or Pre-reg. COLG math waiver only with a score of 908 or SAT/ACT Elig for Mth 100 with a score of 994 or COLLEGE DEGREE with a score of 988 or SAT/ACT Elig Eng101 Mth100 with a score of 995 or Transf. Eng 101 Mth 100 with a score of 999

MTH 113 College Algebra with Trig (4 Credits)
This course covers topics from algebra and trigonometry at a level and emphasis appropriate for applied technology majors who will continue on with at least one semester of applied calculus. Topics are chosen from the following: functions and their graphs, angles and triangles, systems of linear equations with determinants, trigonometric functions, equations and identities, exponential and logarithmic functions, and a general treatment of conic sections.
Pre-requisites: (Companion Arithmetic with a score of 069 and Companion Elementary Algebra with a score of 109) or (Arithmetic (Next-Gen) with a score of 260 and Quant,Algebra,Stats(Next-Gen) with a score of 275) or (Bilingual Computation with a score of 20 and Bilingual Algebra with a score of 26) or MTH 100 with a minimum grade of C

MTH 114 Unified Calculus I (3 Credits)
This course provides an introduction to one variable differential and integral calculus, emphasizing methods and applications. Topics include limits, continuity, the derivative, differentiation formulas for algebraic functions, anti-differentiation, the Fundamental Theorem of Calculus, and an introduction to the techniques of integration.
Pre-requisites: MTH 113 with a minimum grade of C or MTH 120 with a minimum grade of C

MTH 116 Medical Math Calculations (1 Credit)
This course reviews basic mathematical calculations and conversions and emphasizes how these techniques are used in the administration of medications.
Pre-requisites: (((Companion Arithmetic with a score of 069 and Companion Elementary Algebra with a score of 076) or (Arithmetic (Next-Gen) with a score of 260 and Quant,Algebra,Stats(Next-Gen) with a score of 260) or (Bilingual Computation with a score of 20 and Bilingual Algebra with a score of 19) or MTH 092 with a minimum grade of C or Move Up Math 092 with a score of P or MTH 092 Summer Bridge with a score of P or TRANSFERRED COLLEGE LEVEL MATH with a score of 898 or Elig. for Math 100,101,103 with a score of 905 or Pre-reg. COLG math waiver only with a score of 908 or SAT/ACT Elig for Mth 100 with a score of 994) or COLLEGE DEGREE with a score of 988 or SAT/ACT Elig Eng101 Mth100 with a score of 995 or Transf. Eng 101 Mth 100 with a score of 999)

MTH 118 Precalculus (4 Credits)
Topics covered include polynomial, piecewise, rational, exponential, logarithmic, and trigonometric functions, their graphs, and applications involving such functions; polar coordinates; conic sections; and a brief introduction to sequences. This course is designed for students who are pursuing the 2+2 ECC – Rutgers-Newark Biology/Pre-Medicine major and, as such, plan to take only MTH 121 in the calculus sequence. This is not an appropriate course for students who plan to take more than one course in the calculus sequence.
Pre-requisites: (Companion Arithmetic with a score of 069 and Companion Elementary Algebra with a score of 109) or (Arithmetic (Next-Gen) with a score of 260 and Quant,Algebra,Stats(Next-Gen) with a score of 275) or (Bilingual Computation with a score of 20 and Bilingual Algebra with a score of 26) or MTH 100 with a minimum grade of C or Elig. for Pre Calculus with a score of 913

MTH 119 Pre-Calculus I (4 Credits)
Topics covered include absolute value inequalities and polynomial inequalities; relations and functions; polynomials and rational functions and their graphs; logarithmic and exponential functions; determinants and matrices. A graphing calculator may be required. This course is designed for students who plan to take MTH 121. (Note: Both MTH 119 & MTH 120 are required prerequisites of MTH 121.)
Pre-requisites: (Companion Arithmetic with a score of 069 and Companion Elementary Algebra with a score of 109) or (Arithmetic (Next-Gen) with a score of 260 and Quant,Algebra,Stats(Next-Gen) with a score of 275) or (Bilingual Computation with a score of 20 and Bilingual Algebra with a score of 26) or MTH 100 with a minimum grade of C or Elig. for Pre Calculus with a score of 913

MTH 120 Pre-Calculus II (4 Credits)
This course, along with MTH 119, prepares students for a rigorous treatment of calculus. Topics covered include trigonometric functions; graphing trig functions; inverse trig functions; trigonometric identities; trig equations; vectors; analytic geometry; polar coordinates; sequences and series. A graphing calculator may be required.
Pre-requisites: MTH 119 with a minimum grade of C

MTH 121 Calc with Analytic Geom I (4 Credits)
This is the first course covering a rigorous sequence in early transcendental calculus. Topics covered include the theory and application of limits, continuity, differentiation, anti-differentiation and the Fundamental Theorem of Calculus. Methods and applications include related rates, implicit differentiation, indeterminate forms, Newton's method, the Mean Value theorems, and volumes.
Pre-requisites: MTH 118 with a minimum grade of C or MTH 120 with a minimum grade of C or Elig. for Calculus I with a score of 910

MTH 122 Calc with Analytic Geom II (4 Credits)
This course is a continuation of MTH 121. Topics covered include techniques of integration with applications of surface area and arc length, parametric equations, polar coordinates, conic sections, and infinite sequences and series.
Pre-requisites: MTH 121 with a minimum grade of C

MTH 127 Basic Calculus (4 Credits)
This course is an intuitive approach to differential and integral calculus of a single variable, with an introduction to multivariable differential calculus, emphasizing applications in business, economics, and the social sciences.
Pre-requisites: (Companion Arithmetic with a score of 069 and Companion Elementary Algebra with a score of 109) or (Arithmetic (Next-Gen) with a score of 260 and Quant,Algebra,Stats(Next-Gen) with a score of 275) or (Bilingual Computation with a score of 20 and Bilingual Algebra with a score of 26) or MTH 100 with a minimum grade of C

MTH 136 Discrete Mathematics (3 Credits)
This is a course in finite mathematical structures relevant to computer science and computer information systems. Topics include sets, relations, functions, graphs, trees, methods of proof including mathematical induction, Boolean algebras and their use in circuit design, elementary combinatorics, coding theory and formal languages.
Pre-requisites: MTH 113 with a minimum grade of C or MTH 119 with a minimum grade of C

MTH 141 Mathematical Statistics (3 Credits)
Pre-requisites: MTH 114 with a minimum grade of C or MTH 121 with a minimum grade of C

MTH 213 Unified Calculus II (3 Credits)
This course is a continuation of MTH 114. Topics include volumes of solids of revolution; derivatives and integrals of transcendental functions; further techniques and applications of integration; polar coordinates; an introduction to multivariable calculus; and first-order differential equations.
Pre-requisites: MTH 114 with a minimum grade of C or MTH 121 with a minimum grade of C

MTH 221 Calc with Analytic Geom III (4 Credits)
This course is a continuation of MTH 122, covering the theory and applications of vector differential and integral Calculus. Topics include parametric curves, general vector fields, partial derivatives, vector differential operators, non-rectangular coordinate systems, multiple integrals, the change of variables theorems, and the vector integral theorems of Green, Gauss and Stokes.
Pre-requisites: MTH 122 with a minimum grade of C

MTH 222 Differential Equations (4 Credits)
This course covers methods for solving ordinary differential equations together with physical and geometric applications and places particular emphasis on linear equations with constant coefficients. Topics include 1st-order equations, the nth-order linear equation, series solutions, Laplace Transforms, linear systems and numerical methods.
Pre-requisites: MTH 221 with a minimum grade of C

MTH 239 Introduction to Linear Algebra (3 Credits)
This course is an introduction to the theory and applications of linear operators on finite dimensional vector spaces. Topics include linear systems, matrix algebra, Euclidean and general vector spaces, subspaces, change of basis and similarity, the eigenvalue problem, projections, orthogonality and least squares, inner product spaces and quadratic forms.
Pre-requisites: MTH 121 with a minimum grade of C

MTH 250 Mathematics Capstone (3 Credits)
Pre-requisites: MTH 121 with a minimum grade of B and MTH 122 with a minimum grade of B and MTH 221 with a minimum grade of B and MTH 222 with a minimum grade of B and MTH 239 with a minimum grade of B and PHY 103 with a minimum grade of B and PHY 104 with a minimum grade of B