

# MATHEMATICS (MTH)

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## **MTH 111. Basic Technical Mathematics. (3 Credits)**

Provides a foundation in mathematics with emphasis in arithmetic, unit conversion, basic algebra, geometry and trigonometry. This course is intended for CTE programs. Lecture 3 hours per week. Total 3 hours per week Prerequisite: See Table M for placement information.

## **MTH 132. Business Mathematics. (3 Credits)**

Provides instruction, review, and drill in percentage, cash and trade discounts, mark-up, payroll, sales, property and other taxes, simple and compound interest, bank discounts, loans, investments, and annuities. This course is intended for occupational/technical programs. Lecture 3 hours per week. Total 3 hours per week. Prerequisite: See Table M for placement information.

## **MTH 154. Quantitative Reasoning. (3 Credits)**

Presents topics in proportional reasoning, modeling, financial literacy and validity studies (logic and set theory). Focuses on the process of taking a real-world situation, identifying the mathematical foundation needed to address the problem, solving the problem and applying what is learned to the original situation. This is a Passport and UCGS transfer course. Lecture 3 hours per week. Total 3 hours per week. Prerequisite: See Table M for placement information.

## **MTH 155. Statistical Reasoning. (3 Credits)**

Presents elementary statistical methods and concepts including visual data presentation, descriptive statistics, probability, estimation, hypothesis testing, correlation and linear regression. Emphasis is placed on the development of statistical thinking, simulation, and the use of statistical software. Credit will not be awarded for both MTH 155: Statistical Reasoning and MTH 245: Statistics I or equivalent. This is a Passport and UCGS transfer course. Lecture 3 hours per week. Total 3 hours per week. See Table M for placement information.

## **MTH 161. Precalculus I. (3 Credits)**

Presents topics in power, polynomial, rational, exponential, and logarithmic functions, and systems of equations and inequalities. Credit will not be awarded for both MTH 161: Precalculus I and MTH 167: Precalculus with Trigonometry or equivalent. This is a Passport and UCGS transfer course. Prerequisite: See Table M for placement information.

## **MTH 162. Precalculus II. (3 Credits)**

Presents trigonometry, trigonometric applications including Law of Sines and Cosines and an introduction to conics. Credit will not be awarded for both MTH 162: Precalculus II and MTH 167: Precalculus with Trigonometry or equivalent. This is a Passport and UCGS transfer course. Lecture 3 hours. Total 3 hours per week. Prerequisites: Placement or completion of MTH 161: Precalculus I or equivalent with a grade of C or better.

## **MTH 167. Precalculus with Trigonometry. (5 Credits)**

Presents topics in power, polynomial, rational, exponential, and logarithmic functions, systems of equations, trigonometry, and trigonometric applications, including Law of Sines and Cosines, and an introduction to conics. Credit will not be awarded for both MTH 167: Precalculus with Trigonometry and MTH 161/MTH 162: Precalculus I and II or equivalent. This is a Passport and UCGS transfer course. Lecture 5 hours. Total 5 hours per week. Prerequisite: See Table M for placement information.

## **MTH 195. Topics In:. (1-5 Credits)**

Provides an opportunity to explore topical areas of interest to or needed by students. MTH 195 is a conceptually based, hands-on course that examines the underlying structures of numbers and operations. The course focuses on using manipulatives and models to make sense of mathematics. Where traditional mathematics instruction focuses on procedural fluency (the "how"), this course focuses on the conceptual understanding (the "why"). This course is designed for elementary and middle school education majors who are planning to transfer to JMU. Lecture 4 hours per week. Total 4 hours per week.

## **MTH 245. Statistics I. (3 Credits)**

Presents an overview of statistics, including descriptive statistics, elementary probability, probability distributions, estimation, hypothesis testing, correlation, and linear regression. Credit will not be awarded for both MTH 155: Statistical Reasoning and MTH 245: Statistics I or equivalent. This is a Passport and UCGS transfer course. Lecture 3 hours. Total 3 hours per week. Prerequisite: Completion of MTH 154 or MTH 161 or equivalent with a grade of C or better.

## **MTH 261. Applied Calculus I. (3 Credits)**

Introduces limits, continuity, differentiation and integration of algebraic, exponential and logarithmic functions, and techniques of integration with an emphasis on applications in business, social sciences and life sciences. This is a Passport and UCGS transfer course. Lecture 3 hours. Total 3 hours per week. Prerequisite: Completion of MTH 161 or equivalent with a grade of C or better.

## **MTH 263. Calculus I. (4 Credits)**

Presents concepts of limits, derivatives, differentiation of various types of functions and use of differentiation rules, application of differentiation, antiderivatives, integrals and applications of integration. This is a Passport and UCGS transfer course. Lecture 4 hours. Total 4 hours per week. Prerequisite: Completion of MTH 167 or MTH 161/162 or equivalent with a grade of C or better.

## **MTH 264. Calculus II. (4 Credits)**

Continues the study of calculus of algebraic and transcendental functions including rectangular, polar, and parametric graphing, indefinite and definite integrals, methods of integration, and power series along with applications. Features instruction for mathematical, physical and engineering science programs. This is a UCGS transfer course. Lecture 4 hours. Total 4 hours per week. Prerequisite: Completion of MTH 263 or equivalent with a grade of C or better.

**MTH 265. Calculus III. (4 Credits)**

Focuses on extending the concepts of function, limit, continuity, derivative, integral and vector from the plane to the three dimensional space. Covers topics including vector functions, multivariate functions, partial derivatives, multiple integrals and an introduction to vector calculus. Features instruction for mathematical, physical, and engineering science programs. Lecture 4 hours per week. Total 4 hours per week. Prerequisite: Completion of MTH 264 or equivalent with a grade of C or better.

**MTH 266. Linear Algebra. (3 Credits)**

Covers matrices, vector spaces, determinants, solutions of systems of linear equations, basis and dimension, eigenvalues, and eigenvectors. Features instruction for mathematical, physical and engineering science programs. Lecture 3 hours per week. Total 3 hours per week. Prerequisite: Completion of MTH 263 or equivalent with a grade of B or better or MTH 264 or equivalent with a grade of C or better.

**MTH 267. Differential Equations. (3 Credits)**

Introduces ordinary differential equations. Includes first order differential equations, second and higher order ordinary differential equations with applications, and numerical methods. Lecture 3 hours per week. Total 3 hours per week. Prerequisite: MTH 264 or equivalent with a grade of C or better.

**MTH 280. College Geometry. (3 Credits)**

Presents topics in Euclidean and non-Euclidean geometries chosen to prepare individuals for teaching geometry at the high school level or for other areas of study applying geometric principles. Studies Euclid's geometry and its limitations, axiomatic systems, techniques of proof, and Hilbert's geometry, including the parallel postulates for Euclidean, hyperbolic, and elliptic geometries. Lecture 3 hours per week. Total 3 hours per week. Prerequisite: MTH 263 with C or better or equivalent.

**MTH 281. Introductory Abstract Algebra. (3 Credits)**

Introduces groups, isomorphisms, fields, homomorphisms, rings, and integral domains. Applicable to some education licensure programs; not intended for STEM majors. Lecture 3 hours per week. Total 3 hours per week. Prerequisite: MTH 263 with C or better or equivalent.

**MTH 288. Discrete Mathematics. (3 Credits)**

Presents topics in sets, counting, graphs, logic, proofs, functions, relations, mathematical induction, Boolean Algebra, and recurrence relations. Lecture 3 hours per week. Total 3 hours per week. Prerequisite: MTH 263 or equivalent with a grade of C or better.

**MTH 299. Supervised Study. (1-5 Credits)**

Assigns problems for independent study incorporating previous instruction and supervised by the instructor. May be repeated for credit. Variable hours.