

# MATHEMATICS (MTH) CPSO

# Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

## MTH 402 - Math for Our World

**Credits:** 4

This course takes an integrated approach to the study of mathematics, combining mathematical concepts with applications in the real world. It addresses topics in mathematics necessary in a college education, providing the reasoning strategies needed for mathematical problem solving in the workplace, the media, and everyday life. The course serves as the foundation for higher-level math courses and provides the quantitative skills necessary to be adequately prepared for coursework in other academic areas. The overarching goal is to learn to interpret quantitative and statistical information that we encounter daily. Students will understand how real-world problems can be analyzed using the power and rigor of mathematical and statistical models. Topics include: problem solving, math of finance, geometry, basic probability, and beginning statistical concepts with an emphasis on real world applications and interpreting information. The use of Excel will be incorporated into the topics of this course. Acceptable scores on Accuplacer Arithmetic and Elementary Algebra Accuplacer Classic or Next Generation Accuplacer assessments; or approved exemption based on previous high school transcripts: a grade of C or better in both Algebra and Geometry taken within the last five years; or SAT Math score of 500+ or ACT Math score of 18+ taken within five years of registration; or successful completion of the ALEKS Program Math Tutorial as determined by the college's math faculty required. Accuplacer or ALEKS assessments should be completed within five years of registering for course.

**Attributes:** Mathematics (Gen Ed); Quantitative Reasoning(Disc)

**Prerequisite(s):** (Classic Arithmetic Accuplacer with a score of 080 and CL Elem Algebra - Accuplacer with a score of 036) or (Arithmetic Accuplacer-Next Gen with a score of 263 and Quant,Alg,Stats Accp-Next Gen with a score of 237) or C MATH 405/or taken elsewhere with a score of WAIV or SAT Math with a score of 500 or ACT Reading with a score of 18 or GSC Math Workshop Completed with a score of WAIV.

**Equivalent(s):** MATH 502G

**Grade Mode:** Letter Grading

## MTH 504 - Statistics

**Credits:** 4

This course addresses introductory statistical concepts, methods, and procedures important for making well-informed decisions in real world settings. It provides students with both theoretical principles and practical skills in statistics. Topics include an overview of descriptive and inferential statistics, specifically sampling, measurements of central tendency and dispersion, frequency distributions, graphing techniques, probability theory, hypothesis testing, normal distribution, regression and correlation, t-tests, and analysis of variance. An acceptable score on the Classic or Next Generation Accuplacer arithmetic and elementary algebra assessment. Accuplacer assessments should be completed within five years of registering for course. NOTE: Excel proficiency is expected prior to enrollment in this course.

**Attributes:** Mathematics (Gen Ed); Quantitative Reasoning(Disc)

**Prerequisite(s):** MTH 402 with a minimum grade of D- or MATH 502G with a minimum grade of D-.

**Equivalent(s):** MATH 504G

**Mutual Exclusion:** No credit for students who have taken PSYC 402, PSYC 402H, SOC 402, SOC 402H, SOC 502, SOC 502H.

**Grade Mode:** Letter Grading

## MTH 510 - Pre-Calculus

**Credits:** 4

This course is intended as a bridge course between algebra and calculus. The course focuses on strengthening the student's mathematical problem solving skills and developing a firm understanding of functions, their graphical representation, their behavior, and their use to model real-life situations. Various classes of functions will be highlighted: polynomials, rational, exponential, logarithmic, and trigonometric. Topics may also include: algebraic concepts, real number system, systems of equations and inequalities, complex numbers, and polar coordinates. An acceptable score on the Classic or Next Generation Accuplacer assessment(s) is accepted prior to taking this course. Accuplacer assessments should be completed within five years of registering for course. A graphing calculator is required.

**Attributes:** Mathematics (Gen Ed); Quantitative Reasoning(Disc)

**Prerequisite(s):** MTH 402 with a minimum grade of D- or MATH 502G with a minimum grade of D-.

**Equivalent(s):** MATH 510G

**Grade Mode:** Letter Grading

## MTH 544 - Special Topics: Lower Level

**Credits:** 1-4

A study of current and variable topic in mathematics. Course content will change from term to term.

**Repeat Rule:** May be repeated up to unlimited times.

**Equivalent(s):** MATH 544G

**Grade Mode:** Letter Grading

## MTH 701 - Probability and Statistics

**Credits:** 4

In this course students study topics in data analysis including: descriptive and inferential statistics, probability, odds and fair games, probability distributions, normal distributions, and estimation. Among the topics are numerical and graphical summaries for one and two variables, linear regression and correlation, confidence intervals and tests concerning means, sampling and experimentation, basic probability, confidence intervals, hypothesis testing, sampling distributions, two-sample t-tests for means, chi-squared tests, regress and correlation, and possible other topics. A standards statistical software package is used throughout the course to support the course format that includes: hands-on activities, computer-based simulations, creating and implementing student developed investigations, and actual secondary and middle school mathematics classroom activities. Throughout the course students are given opportunities to relate the mathematical concepts studied in this course to the mathematical concepts they will be teaching.

**Prerequisite(s):** MTH 402 with a minimum grade of D- or MATH 502G with a minimum grade of D-.

**Equivalent(s):** MATH 603G

**Mutual Exclusion:** No credit for students who have taken MATH 439, MATH #623, PSYC 402, SOC 402, SOC 402H, SOC 502.

**Grade Mode:** Letter Grading

**MTH 702 - Mathematical Proof****Credits:** 4

This course introduces students to the language and methods used to create and write mathematical proofs and solve problems. Methods of proof will include: direct, contrapositive, contradiction, and induction. Methods of problem solving will be based on Polya's four steps for problem solving. Students will learn about and utilize the many functions of proof including: verification, explanation, communication, discovery, justification, and inquiry. The course will also explore the relationship between problem solving and the process of proving. Students will explore fundamental abstract concepts in mathematics chosen from the following areas: functions and relations, set theory, number theory, and logic, Euclidian and non-Euclidian geometry, algebra, mathematical reasoning, proof, and problem solving. Connections to middle and secondary school mathematics.

**Prerequisite(s):** MTH 510 with a minimum grade of D- or MATH 510G with a minimum grade of D-.

**Equivalent(s):** MATH 600G

**Grade Mode:** Letter Grading

**MTH 703 - Number Systems****Credits:** 4

This course examines the structure and properties of mathematics while focusing on the development of mental mathematics strategies and problem solving skills. Topics include sets, functions, applications of rational numbers, integers, fractions, decimals, percentages, and number theory. Appropriate grade level techniques are utilized to investigate algorithms, probability and statistics, counting techniques, scientific notation, complex numbers, exponents, geometry, and measurement. Students will also investigate ratios, proportion, data analysis, patterns, and the connections to algebra and geometry topics in the context of the 5-12 grades mathematics curriculum.

**Prerequisite(s):** MTH 510 with a minimum grade of D- or MATH 510G with a minimum grade of D-.

**Equivalent(s):** MATH 601G

**Mutual Exclusion:** No credit for students who have taken MATH 621.

**Grade Mode:** Letter Grading

**MTH 704 - Geometric Structures****Credits:** 4

This course will examine concepts in Euclidean and non-Euclidean geometries. Course topics include area and volume, two- and three-dimensional perspective, congruence and similarity, properties of and relationships among geometric shapes and structures. Students will investigate graphing, vectors, motion, and symmetry. Students engage in course concepts through proofs, problem solving, dynamic geometric software, and through activities used in secondary and middle school mathematics. Throughout the course students will be given opportunities to relate the mathematical concepts studied to the mathematical concepts they will be teaching.

**Prerequisite(s):** MTH 510 with a minimum grade of D- or MATH 510G with a minimum grade of D-.

**Equivalent(s):** MATH 602G

**Mutual Exclusion:** No credit for students who have taken MATH 622.

**Grade Mode:** Letter Grading

**MTH 705 - Calculus I****Credits:** 4

This course is the first semester of a calculus sequence dealing with applications and modeling of the differential and integral calculus. The course focuses on functions and their graphs, limits, continuity, differentiation, integration, the derivative and its uses in optimization and mathematical modeling, as well as the Fundamental Theorem. Throughout the course students are given opportunities to relate the mathematical concepts studied to the mathematical concepts they will be teaching. Graphing calculators are used throughout the course to explore and represent concepts.

**Prerequisite(s):** MTH 510 with a minimum grade of D- or MATH 510G with a minimum grade of D-.

**Equivalent(s):** MATH 606G

**Mutual Exclusion:** No credit for students who have taken MATH 425.

**Grade Mode:** Letter Grading

**MTH 706 - History of Mathematics****Credits:** 4

This course addresses the historical development of major themes in mathematics, including calculation, numbers, geometry, algebra, infinity, and formalism in various civilizations ranging from the antiquity of Babylonia and Egypt through classical Greece, the Middle and Far East, and on to modern Europe. The course emphasizes how earlier civilizations influenced or failed to influence later ones and how the concepts evolved in these various civilizations.

**Prerequisite(s):** MTH 705 with a minimum grade of D- or MATH 606G with a minimum grade of D-.

**Equivalent(s):** MATH 608G

**Mutual Exclusion:** No credit for students who have taken MATH 790.

**Grade Mode:** Letter Grading

**MTH 707 - Calculus II****Credits:** 4

This course is the second semester of a calculus sequence dealing with applications of differential and multivariable calculus. Topics include the calculus of transcendental functions, applications of integration, some differential equations, sequences and series, differentiation and integration of trigonometric functions multidimensional calculus with applications, and an introduction to multivariable calculus. Throughout the course students are given opportunities to relate the mathematical concepts studied to the mathematical concepts they will be teaching. Graphing calculators are used throughout the course to explore and represent concepts.

**Prerequisite(s):** MTH 705 with a minimum grade of D- or MATH 606G with a minimum grade of D-.

**Equivalent(s):** MATH 607G

**Mutual Exclusion:** No credit for students who have taken MATH 426, MATH 527, MATH 528.

**Grade Mode:** Letter Grading

**MTH 708 - Discrete Mathematics****Credits:** 4

This course is designed to introduce students to discrete and abstract mathematical topics. Topics include propositional and predicate logic; elementary set theory; introduction to proof techniques including mathematical induction; sets, relations, functions, and relations; recurrence relations, graph theory, as well as the properties of groups, rings, and fields. Students study number systems, mathematical induction, algorithms and complex number systems, matrix manipulation, combinatorics, graph theory, and finite differences. Course activities are based on secondary and middle school mathematics curricula. This course considers the basic objects of mathematics through real-world examples and the methods used to elucidate their properties.

**Prerequisite(s):** MTH 705 with a minimum grade of D- or MATH 606G with a minimum grade of D-.

**Equivalent(s):** MATH 605G

**Grade Mode:** Letter Grading

**MTH 709 - Topics in Linear and Abstract Algebra****Credits:** 4

This course examines concepts in algebra including: patterns and functions, arithmetic sequences, geometric sequences, arithmetic and algebra of the integers, least common multiple and greatest common divisor, inequalities, modular arithmetic and systems of numbers, properties of groups and fields, the field of complex numbers, polynomial arithmetic and algebra, linear equations. The course develops the mathematical structures, algebraic properties, and applications of matrices, determinants, vectors, vector spaces, systems of linear equations, and linear transformations. Students engage with these concepts through exploration, analysis, proof, and problem solving based on activities used in secondary and middle school mathematics. Throughout the course students are given opportunities to relate the mathematical concepts studied to the mathematical concepts they will be teaching.

**Prerequisite(s):** MTH 707 with a minimum grade of D- or MATH 607G with a minimum grade of D-.

**Equivalent(s):** MATH 604G

**Mutual Exclusion:** No credit for students who have taken MATH 545.

**Grade Mode:** Letter Grading

**MTH 710 - Algebra Theory for Middle School Teachers****Credits:** 4

This course will examine concepts in algebra including patterns and functions, arithmetic sequences, geometric sequences, arithmetic and algebra of the integers, least common multiple and greatest common divisor, inequalities, modular arithmetic and systems of numbers, basic properties of groups and fields, and polynomial arithmetic and algebra. This course will develop mathematical structures, algebraic properties, and applications of matrices. Students will engage with these concepts through exploration, analysis, proof, and problem solving based on activities used in middle school mathematics. Throughout the course students will be given opportunities to relate the mathematical concepts studied to the mathematical concepts they will be teaching.

**Prerequisite(s):** (MTH 402 with a minimum grade of D- or MATH 502G with a minimum grade of D-) and (MTH 705 with a minimum grade of D- or MATH 606G with a minimum grade of D-).

**Equivalent(s):** MATH 609G

**Grade Mode:** Letter Grading

**MTH 744 - Special Topics: Upper Level****Credits:** 1-4

A study of current and variable topics in mathematics. Course content will change from term to term.

**Repeat Rule:** May be repeated up to unlimited times.

**Equivalent(s):** MATH 644G

**Grade Mode:** Letter Grading