

# STUDENT LEARNING OUTCOMES FOR THE SANTIAGO CANYON COLLEGE MATHEMATICS DEPARTMENT

(Last Revised 8/20/14)

## Department SLOs:

Upon completion of any course in Mathematics the student will be able to:

1. Create mathematical models of real world phenomena, apply those models to make predictions about the behavior of the phenomena, apply appropriate problem solving techniques, and critically evaluate the veracity of the obtained results.
2. Clearly communicate mathematical reasoning and problem solving skills using a variety of formats, diverse technologies, and appropriate mathematical vocabulary and notation.
3. Integrate into educational and professional conduct a calm, confident, and ethical approach to mathematical reasoning and problem solving while taking personal responsibility for mathematical successes

## Course SLOs:

Math N05—Basic Mathematics

1. Read, define and apply arithmetic vocabulary and symbols
2. Evaluate arithmetic expressions and perform order of operations on simple arithmetic expressions
3. Apply arithmetic principles to solve simple real world problems and understand the use of percent
4. Recognize basic geometric figures and evaluate simple properties of these figures

Math N06—Essential Mathematics

1. Read, define and apply arithmetic vocabulary and symbols
2. Evaluate arithmetic expressions and perform order of operations on simple arithmetic expressions
3. Apply arithmetic principles to solve simple real world problems and understand the use of percent
4. Recognize basic geometric figures and evaluate simple properties of these figures

Math N06L—Essential Mathematics Math Lab

1. Students will be able to classify and identify different problem types in essential mathematics and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in essential mathematics.

Math 030—Coping with Math Anxiety

1. Analyze sources of math anxiety and construct proactive/positive reframes of negative thoughts about math.
2. Appraise current math knowledge and personal learning styles.
3. Apply study strategies to increase core math skills and decrease anxiety when approaching math homework and exams

Math N48—Pre-Algebra/Algebra Basics

1. Students will be able to recognize, read and apply algebraic vocabulary and symbols.
2. Students will be able to perform algebraic operations on polynomials, solve basic linear equations and make connections between solutions to linear equations with two variables and Cartesian graphs.
3. Students will be able to model real world situations with appropriate mathematical notation and interpret solutions.

Math N48L—Pre-Algebra/Algebra Basics Math Lab

1. Students will be able to classify and identify different problem types in pre-algebra/algebra basics and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in pre-algebra/algebra basics.

Math 060—Elementary Algebra

1. Evaluate and perform algebraic operations on polynomial, rational and radical expressions

2. Solve word problems and equations involving linear, quadratic and rational expressions using appropriate algebraic techniques.
3. Manipulate and analyze linear equations including finding slope, intercepts, graph and equation.

Math 060L—Beginning Algebra Math Lab

1. Students will be able to classify and identify different problem types in elementary algebra and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in elementary algebra.

Math 070—Geometry

1. Read, define and apply geometric vocabulary and symbols.
2. Translate the physical world via geometric concepts and the relationships between geometric figures.
3. Evaluate geometric data through deductive and inductive reasoning.
4. Incorporate geometric figures in critical thinking and logical approaches to problem solving.

Math 070L—Geometry Math Lab

1. Students will be able to classify and identify different problem types in geometry and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in geometry.

Math N73L—Math Review

1. Students will be able to classify and identify different problem types and select suitable problem solving techniques.
2. Students will be able to model and solve class appropriate applications in a clear, organized and professional manner.

Math 080—Intermediate Algebra

1. Read, define and apply algebraic and functional vocabulary and symbols
2. Evaluate, perform algebraic operations, and solve equations involving linear, rational, radical, quadratic, exponential and logarithmic expressions
3. Set up and solve word problems involving linear, quadratic, rational, radical, exponential and logarithmic expressions, or systems of linear equations in two or three variables.
4. Graph linear, quadratic, absolute value, power, exponential and logarithmic functions, and apply graphing transformations.

Math 080L—Intermediate Algebra Math Lab

1. Students will be able to classify and identify different problem types in intermediate algebra and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in intermediate algebra.

Math N83L—Math Review

1. Students will be able to classify and identify different problem types and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills.

Math N93L—Math Review

1. Students will be able to classify and identify different problem types and select suitable problem solving techniques.
2. Students will be able to model and solve class level appropriate applications in a clear, organized and professional manner.

Math N98L— Survey of Math Topics and History

1. Students will be able to model and solve class-level appropriate applications in a clear, organized, and professional manner.
2. Students will be able to identify mathematicians in their area of study and possess an increased awareness of specific history topics relating to their math course.

#### Math 105—Mathematics for Liberal Arts Students

1. Students will be able to recognize mathematical applications in everyday life and demonstrate appropriate, relevant problem solving skills.
2. Students will locate and utilize mathematical resources and technology while demonstrating numerical reasoning and literacy.

#### Math 105L—Mathematics for Liberal Arts Students Math Lab

1. Students will be able to classify and identify different problem types in mathematics for liberal arts and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in mathematics for liberal arts.

#### Math 140—College Algebra

1. Use algebraic, numerical, and graphical processes to manipulate and analyze equations, inequalities, and functional relationships.
2. Formulate and analyze mathematical models for a variety of real-world phenomenon and use mathematical and technological tools to determine the veracity of the model.

#### Math 140L—College Algebra Math Lab

1. Students will be able to classify and identify different problem types in college algebra and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in college algebra.

#### Math 150-- Calculus for Biological, Management and Social Sciences

1. Apply appropriate critical thinking, analytical reasoning and problem solving techniques to model real world contexts in the fields of Business, Economics, Social Sciences and Biology.
2. Solve problems using differentiation and integration of single- and multi-variable calculus.
3. Interpret and communicate mathematical results (from models in fields mentioned in "1") in a clear, accurate and professional manner.
4. Analyze the results of modeling real world data and contrast interpolative and extrapolative barriers to their application.

#### Math 150L-- Calculus for Biological, Management and Social Sciences Math Lab

1. Students will be able to classify and identify different problem types in calculus for biological, management and social sciences and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills for biological, management and social sciences and future math classes.

#### Math 160--Trigonometry

1. Analyze, sketch and apply the six trigonometric functions and polar equations using such principles as asymptotic, periodic, and reciprocal behavior, as well as plotting points generated by a table or electronic device.
2. Model, evaluate and solve equations and real-world problems using inverse functions, Law of Sines, Law of Cosines, technological tools, and algebraic techniques.
3. State, verify and apply trig identities, including but not limited to reciprocal, co-functional and Pythagorean identities, sum and difference identities, double- and half-angle identities.

#### Math 160L—Trigonometry Math Lab

1. Students will be able to classify and identify different problem types in trigonometry and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in trigonometry.

#### Math 170—Pre-Calculus Mathematics

1. Use algebraic, numerical, and graphical processes to manipulate and analyze equations, inequalities, and functional relationships.
2. Formulate and analyze mathematical models for a variety of real-world phenomenon and use mathematical and technological tools to determine the veracity of the model.

#### Math 170L—Pre-Calculus Mathematics Math Lab

1. Students will be able to classify and identify different problem types in pre-calculus mathematics and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in pre-calculus mathematics.

Math 180—Analytic Geometry and Calculus

1. Analyze functions analytically and graphically using limits, derivatives, definite and indefinite integrals.
2. Apply basic definitions, properties and theorems of first semester Calculus to formulate elementary proofs and model and solve problems.

Math 180H—Honors Analytic Geometry and Calculus

1. Analyze functions analytically and graphically using limits, derivatives, definite and indefinite integrals.
2. Apply basic definitions, properties and theorems of first semester Calculus to formulate elementary proofs and model and solve problems.

Math 180L—Analytic Geometry and Calculus Math Lab

1. Students will be able to classify and identify different problem types in analytic geometry and calculus and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in analytic geometry and calculus.

Math 185—Analytic Geometry and Calculus

1. Evaluate and approximate integrals using a variety of techniques and apply integration to solve problems involving area, volume, work, and differential equations.
2. Represent functions using parametric equations, polar equations, and Taylor series and apply calculus techniques to these representations

Math 185L—Analytic Geometry and Calculus Math Lab

1. Students will be able to classify and identify different problem types in analytic geometry and calculus, beyond the level of Mathematics 180, and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in analytic geometry and calculus, beyond the level of Mathematics 180.

Math 203—Fundamental Concepts of Elementary Mathematics

1. Analyze the structure and properties of rational and real number systems including their decimal representation and illustrate the use of a representation of these numbers including the number line model.
2. Evaluate the equivalence of numeric algorithms and explain the advantages and disadvantages of equivalent algorithms.
3. Analyze multiple approaches to solving problems from elementary to advanced levels of mathematics, using concepts and tools from sets, logic, functions, number theory and patterns.

Math 203L—Fundamental Concepts of Elementary Mathematics Math Lab

1. Students will be able to classify and identify different problem types in the fundamental concepts of elementary mathematics and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in the fundamental concepts of elementary mathematics.

Math 219—Statistics and Probability

1. Read and critically analyze the validity of a statistical statement by considering how the data was obtained and the appropriateness of the statistical methods used.
2. Collect data from a population and represent it in an organized and visual manner.
3. Read and interpret data represented in a chart or graph.

Math 219H—Honors Statistics and Probability

1. Read and critically analyze the validity of a statistical statement by considering how the data was obtained and the appropriateness of the statistical methods used.
2. Collect data from a population and represent it in an organized and visual manner.

3. Read and interpret data represented in a chart or graph.

Math 219L—Statistics and Probability Math Lab

1. Students will be able to classify and identify different problem types in statistics and probability and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in statistics and probability.

Math 280—Intermediate Calculus

1. State and apply basic definitions, properties and theorems of multivariable Calculus
2. Apply vector operations in two and three dimensions and use vector methods to analyze plane and space curves, and curvilinear motion.
3. Apply standard techniques of multivariable differentiation and integration to solve application problems

Math 280L—Intermediate Calculus Math Lab

1. Students will be able to classify and identify different problem types in intermediate calculus and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in intermediate calculus.

Math 287—Introduction to Linear Algebra and Differential Equations

1. State and apply basic definitions, properties and theorems of linear algebra and differential equations.
2. Use matrices to solve systems of linear equations and analyze linear transformations and vector spaces.
3. Correctly choose and apply techniques to solve various types of differential equations.
4. Model and solve applications involving differential equations and linear algebra

Math 287L—Introduction to Linear Algebra and Differential Equations Math Lab

1. Students will be able to classify and identify different problem types in the introduction to linear algebra and differential equations and select suitable problem solving techniques.
2. Students will be able to identify and use applicable math study skills in the introduction to linear algebra and differential equations.

Math 290—Linear Algebra

1. State and apply basic definitions, properties and theorems of linear algebra
2. Perform operations on matrices in order to solve systems of linear equations, analyze linear transformations and apply matrix theory to model real-life situations
3. Extend what was known about  $\mathbb{R}$ ,  $\mathbb{R}^2$  and  $\mathbb{R}^3$  by utilizing the concept of a generalized vector space.
4. Compose clear and accurate proofs using the concepts of this course

Math 295—Beginning Differential Equations

1. Demonstrate the ability to communicate basic definitions, properties, and theorems of beginning differential equations
2. Apply various methods to solve the vast array of differential equations encountered in beginning differential equations
3. Demonstrate logical reasoning processes in identifying, modeling, and solving problems.
4. Use the principles of beginning differential equations to apply problem-solving strategies to "real world" situations