High School Course Description for **Mathematical Analysis**

Course Title: Mathematical Analysis
Curricular Area: Math
Course Number: MTH401
Length: One semester
Grade Level: 9-12
Prerequisites: Algebra 2 with a grade of C or better
Meets a UC a-g Requirement:Yes
Meets NCAA Requirement: Yes
Meets High School Graduation Requirement for:
Elective Credit

Course Description
This course combines many of the trigonometric, geometric, and algebraic techniques needed to prepare students for the study of calculus and strengthens their conceptual understanding of problems and mathematical reasoning in solving problems. These standards take a functional point of view towards those topics. The most significant new concept is that of limits.

Alignment
This course is aligned to the Mathematics California Content Standards for Mathematical Analysis.

Instructional Materials

Required Textbook(s)	Supplemental Materials	Web Sites
Precalculus 3rd Edition	Instructor's Edition 0-13-1880454	PHSchool.com/advanced
Blitzer, Robert	Solution's Manual: 0-13-1880373	
ISBN: 0-13-195993	Test Gen 0-13-1880403	

Exit Criteria

Activities	Percentage
Tests/Quizzes	50%
Homework/Participation	30%
Final Examination	20%
Total:	100%

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First Quarter

Weeks: 1 Sections 1.1, 1.2, & 1.3: Functions and their Graphs and Graphing Utilities
2 Sections 1.3, 1.4, & 1.5: Linear Functions and Slope
3 Sections 1.6: Transformations of Functions
4 Sections 1.7 & 1.8: Combinations of Functions, Composite and Inverse Functions
5&6 Sections 1.8, 1.9, & 1.10: Geometry Formulas and Modeling with Functions, Test
7 Sections 2.1, 2.2, & 2.3: Complex Numbers and Quadratic Functions
8 Sections 2.3, 2.4, & 2.5: Graphs of Polynomial Functions
9 Sections 2.6: Rational Functions and their Graphs

Standards:
Math Analysis 4.0: Students know the statement of, and can apply, the fundamental theorem of algebra.
Math Analysis 6.0: Students find the roots and poles of a rational function and can graph the function and locate its aymptotes.
Algebra 5.0: Students solve multistep problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.
Algebra 10.0: Students add, subtract, multiply, and divide monomials and polynomials. Students solve multistep problems, including word problems, by using these techniques.
Geometry 4.0 Students prove basic theorems involving congruence and similarity.
Algebra II 2.0: Students solve systems of linear equations and inequalities (in two or three variables) by substitution, with graphs, or with matrices.
Algebra II 8.0: Students solve and graph quadratic equations by factoring, completing the square, or using the quadratic formula. Students apply these techniques in solving word problems. They also solve quadratic equations in the complex number system.

Unit/Lesson/Sections/Chapters: Chapter 1 Sections 1-10 and Chapter 2 Sections 1-6

Second Quarter

Weeks: 1 Sections 7.1 & 7.2: Solving Systems of Linear Equations
2 Sections 3.1, 3.2, & 3.3: Exponential & Logarithmic Functions
3 Sections 3.4 & 6.3: Logarithmic and Exponential Equations and Polar Coordinates
4 Sections 6.5 & 6.6: Vectors & De Moivre's Theorem
5 Sections 9.1, 9.2, & 9.3: Conic Sections
6 Sections 9.5: Parametric Equations
7 Sections 10.1, 10.2, & 10.3: Arithmetic & Geometric Sequences and Series
8 Sections 10.3 & 10.4: Mathematical Induction
9 Sections 11.1 & 11.2 Limits

Standards:
Math Analysis 1.0: Students are familiar with, and can apply, polar coordinates and vectors in the plane. In particular, they can translate between polar and rectangular coordinates and can interpret polar coordinates and vectors graphically.
Math Analysis 2.0: Students are adept at the arithmetic of complex numbers. They can use the trigonometric form of complex numbers and understand that a function of a complex variable can be viewed as a function of two real variables. They know the proof of DeMoivre's theorem.
Math Analysis 3.0: Students can give proofs of various formulas by using the technique of mathematical induction.
Math Analysis 5.0: Students are familiar with conic sections, both analytically and geometrically:

Math Analysis 5.1: Students can take a quadratic equation in two variables; put it in standard form by completing the square and using rotations and translations, if necessary; determine what type of conic section the equation represents; and determine its geometric components (foci, asymptotes, and so forth).
Math Analysis 5.2: Students can take a geometric description of a conic section - for example, the locus of points whose sum of its distances from (1, 0) and (-1, 0) is 6 - and derive a quadratic equation representing it.
Math Analysis 6.0: Students find the roots and poles of a rational function and can graph the function and locate its asymptotes.
Math Analysis 7.0: Students demonstrate an understanding of functions and equations defined parametrically and can graph them.
Math Analysis 8.0: Students are familiar with the notion of the limit of a sequence and the limit of a function as the independent variable approaches a number or infinity. They determine whether certain sequences converge or diverge.
Algebra II 2.0: Students solve systems of linear equations and inequalities (in two or three variables) by substitution, with graphs, or with matrices.
Algebra II 11.0: Students prove simple laws of logarithms.
Algebra II 11.1: Students understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.
Algebra II 11.2: Students judge the validity of an argument according to whether the properties of real numbers, exponents, and logarithms have been applied correctly at each step.
Algebra II 12.0: Students know the laws of fractional exponents, understand exponential functions, and use these functions in problems involving exponential growth and decay.
Algebra II 13.0: Students use the definition of logarithms to translate between logarithms in any base.
Algebra II 14.0: Students understand and use the properties of logarithms to simplify logarithmic numeric expressions and to identify their approximate values.
Algebra II 15.0: Students determine whether a specific algebraic statement involving rational expressions, radical expressions, or logarithmic or exponential functions is sometimes true, always true, or never true.
Algebra II 21.0: Students apply the method of mathematical induction to prove general statements about the positive integers.
Algebra II 22.0: Students find the general term and the sums of arithmetic series and of both finite and infinite geometric series.
Algebra II 23.0: Students derive the summation formulas for arithmetic series and for both finite and infinite geometric series.

Unit/Lesson/Sections/Chapters: See Above

Support for English Language Learners:
Teachers will supplement with universal access materials from SB 472 training including word walls, visual aides, and graphic organizers. SDAIE strategies will be employed based on individual student need.

Support for Special Education Students:
Teachers will supplement with universal access materials from SB 472 training including word walls, visual aides, and graphic organizers. Scaffolding strategies will be employed based on individual student need and goals set forth in the IEP.

Stretching the Lesson for GATE Students:
GATE students should be challenged with more challenging exercises such as practice plus exercises in the textbook and in some cases with additional topics in advanced mathematics.