OFFICE OF CURRICULUM, INSTRUCTION & PROFESSIONAL DEVELOPMENT

ACADEMIC COURSE OUTLINE

<table>
<thead>
<tr>
<th>Department</th>
<th>Mathematics</th>
<th>Course Title</th>
<th>Honors Precalculus</th>
<th>Course Code</th>
<th>3053</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Level</td>
<td>9 – 12</td>
<td>Short Title</td>
<td>PRECALC(H)</td>
<td>Grad Requirement Subject</td>
<td>N/A</td>
</tr>
<tr>
<td>Course Length</td>
<td>2 semesters</td>
<td>Credits per Semester</td>
<td>5</td>
<td>Approved for Honors</td>
<td>Yes</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>B or better in Algebra 2 (or Intermediate Algebra)</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Co-requisites</td>
<td>None</td>
<td>Articulated with LBCC</td>
<td>No</td>
<td>Articulated with CSULB</td>
<td>No</td>
</tr>
<tr>
<td>Meets UC “a-g” Requirement</td>
<td>Yes (c)</td>
<td>Meets NCAA Requirement</td>
<td>Yes</td>
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<tr>
<td>Teaching Credential(s)</td>
<td>Teachers with any of these credentials are authorized to teach this course:</td>
<td></td>
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<tr>
<td></td>
<td>• Single Subject Credential in Mathematics (SS)</td>
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COURSE OVERVIEW:
Honors Precalculus combines the trigonometric, geometric, and algebraic techniques needed to prepare students for the study of calculus, and strengthens students’ conceptual understanding of problems and mathematical reasoning in solving problems. Facility with these topics is especially important for students intending to study calculus, physics, and other sciences, and/or engineering in college. Because the standards for this course are (+) standards, students selecting Honors Precalculus should have met the college and career ready standards.

For Honors Precalculus, instructional time should focus on four critical areas: (1) extend work with complex numbers; (2) expand understanding of logarithms and exponential functions; (3) use characteristics of polynomial and rational functions to sketch graphs of those functions; and (4) perform operations with vectors.

Honors Precalculus is designed for the advanced mathematics student who wishes to continue with AP Calculus. Teachers should minimize their review of the concepts and skills covered in Algebra 2. The Honors Precalculus classroom is comprised of a population of students who will need differentiated instruction. Regular use of formative assessment will diagnose the specific needs of the class so that the course can be modified accordingly. To achieve a balance of procedural skills and fluency, deep conceptual understanding, and meaningful real-life applications, resources are available throughout the Glencoe Precalculus textbook and on the Curriculum Intranet.

EXPECTED OUTCOMES
Students are expected to perform at a proficient level on a variety of tasks and assessments addressing the Common Core Standards for Mathematical Practice and the Common Core State Standards addressed in Honors Precalculus. Levels of proficiency are defined near the end of this course outline under Performance Criteria.

Common Core State Standards for Mathematical Practice (SMP)
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Common Core State Standards for Mathematical Content (CCSS-M)

Number and Quantity

<table>
<thead>
<tr>
<th>The Complex Number System</th>
<th>N-CN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N-CN.A</strong></td>
<td><strong>Perform arithmetic operations with complex numbers.</strong></td>
</tr>
<tr>
<td><strong>N-CN.3</strong> (+)</td>
<td>Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.</td>
</tr>
</tbody>
</table>

**N-CN.B** | **Represent complex numbers and their operations on the complex plane.** |
| **N-CN.4** (+) | Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number. |

**N-CN.5** (+) | Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. For example, \((-1 + \sqrt{3}i)^3 = 8\) because \((-1 + \sqrt{3}i)\) has modulus 2 and argument 120°.

**N-CN.6** (+) | Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints. |

Vector and Matrix Quantities

| **N-VM.A** | **Represent and model with vector quantities.** |
| **N-VM.1** (+) | Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., \(v, |v|, ||v||, v\)). |

**N-VM.2** (+) | Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. |

**N-VM.3** (+) | Solve problems involving velocity and other quantities that can be represented by vectors. |

**N-VM.B** | **Perform operations on vectors.** |
| **N-VM.4** (+) | Add and subtract vectors. |
a. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes. |
b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum. |
c. Understand vector subtraction \(v - w\) as \(v + (-w)\), where \(-w\) is the additive inverse of \(w\), with the same magnitude as \(w\) and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise. |

**N-VM.5** (+) | Multiply a vector by a scalar. |
a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as \(c(v_x, v_y) = (cv_x, cv_y)\). |
b. Compute the magnitude of a scalar multiple \(cv\) using \(||cv|| = |c||v||. Compute the direction of \(cv\) knowing that when \(|c|v \neq 0\), the direction of \(cv\) is either along \(v\) (for \(c > 0\)) or against \(v\) (for \(c < 0\)). |

**N-VM.C** | **Perform operations on matrices and use matrices in applications.** |
| **N-VM.6** (+) | Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network. |

**N-VM.7** (+) | Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled. |

**N-VM.8** (+) | Add, subtract, and multiply matrices of appropriate dimensions. |
N-VM.9 (+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.

N-VM.10 (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.

N-VM.11 (+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.

N-VM.12 (+) Work with $2 \times 2$ matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.

**Algebra**

**Seeing Structure in Expressions**  A-SSE

A-SSE.A Interpret the structure of expressions.

A-SSE.1 Interpret expressions that represent a quantity in terms of its context.*

a. Interpret parts of an expression, such as terms, factors, and coefficients.

b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of $P$ and a factor not depending on $P$.

A-SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.

**Arithmetic with Polynomials and Rational Expressions**  A-APR

A-APR.D Rewrite rational expressions.

A-APR.6 Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.

A-APR.7 (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

**Creating Equations**

A-CED.A Create equations that describe numbers or relationships.

A-CED.1 Create equations and inequalities in one variable including ones with absolute value and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. CA*

A-CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. *

A-CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. *

A-CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm’s law $V = IR$ to highlight resistance $R$. *

**Reasoning with Equations and Inequalities**  A-REI

A-REI.C Solve systems of equations.

A-REI.8 (+) Represent a system of linear equations as a single matrix equation in a vector variable.

A-REI.9 (+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension $3 \times 3$ or greater).
Interpreting Functions

F-IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

F-IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.

F-IF.C Analyze functions using different representations.

F-IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

F-IF.10 (+) Demonstrate an understanding of functions and equations defined parametrically and graph them. CA*

F-IF.11 (+) Graph polar coordinates and curves. Convert between polar and rectangular coordinate systems. CA

Building Functions

F-BF-B Build new functions from existing functions.

F-BF.3 Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

F-BF.4 Find inverse functions.

b. (+) Verify by composition that one function is the inverse of another.

c. (+) Read values of an inverse function from a graph or a table, given that the function has an inverse.

d. (+) Produce an invertible function from a non-invertible function by restricting the domain.

Trigonometric Functions

F-TF.A Extend the domain of trigonometric functions using the unit circle.

F-TF.4 (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

F-TF.B Model periodic phenomena with trigonometric functions.

F-TF.6 (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.

F-TF.7 (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.

F-TF.C Prove and apply trigonometric identities.

F-TF.9 (+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.

F-TF.10 (+) Prove the half angle and double angle identities for sine and cosine and use them to solve problems. CA*
**Honors Precalculus, Page 5**

**Geometry**

<table>
<thead>
<tr>
<th>Similarity, Right Triangles, and Trigonometry</th>
<th>G-SRT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>G-SRT.D</strong></td>
<td>Apply trigonometry to general triangles.</td>
</tr>
<tr>
<td><strong>G-SRT.9 (+)</strong></td>
<td>Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.</td>
</tr>
<tr>
<td><strong>G-SRT.10 (+)</strong></td>
<td>Prove the Laws of Sines and Cosines and use them to solve problems.</td>
</tr>
<tr>
<td><strong>G-SRT.11 (+)</strong></td>
<td>Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expressing Geometric Properties with Equations</th>
<th>G-GPE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>G-GPE.A</strong></td>
<td>Translate between the geometric description and the equation for a conic section.</td>
</tr>
<tr>
<td><strong>G-GPE.3 (+)</strong></td>
<td>Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.</td>
</tr>
<tr>
<td><strong>G-GPE.3.1</strong></td>
<td>Given a quadratic equation of the form $ax^2 + by^2 + cx + dy + e = 0$, use the method for completing the square to put the equation into standard form; identify whether the graph of the equation is a circle, ellipse, parabola, or hyperbola and graph the equation. CA</td>
</tr>
</tbody>
</table>

**EXPECTED INTEGRATED OUTCOMES**

(From the California Career Technical Education Model Curriculum Standards, adopted by the California State Board of Education in January, 2013)

Students are also expected to proficiently apply common skills that are relevant across curriculum areas and career pathways.

**Standards for Career Ready Practice (CR)**

1. **Apply appropriate technical skills and academic knowledge.**
   Career-ready individuals readily access and use the knowledge and skills acquired through experience and education. They make connections between abstract concepts with real-world applications and recognize the value of academic preparation for solving problems, communicating with others, calculating measures, and performing other work-related practices.

2. **Communicate clearly, effectively, and with reason.**
   Career-ready individuals communicate thoughts, ideas, and action plans with clarity, using written, verbal, electronic, and/or visual methods. They are skilled at interacting with others: they are active listeners who speak clearly and with purpose, and they are comfortable with terminology that is common to workplace environments. Career-ready individuals consider the audience for their communication and prepare accordingly to ensure the desired outcome.

3. **Develop an education and career plan aligned with personal goals.**
   Career-ready individuals take personal ownership of their educational and career goals and manage their individual plan to attain these goals. They recognize the value of each step in the educational and experiential process, and they understand that nearly all career paths require ongoing education and experience to adapt to practices, procedures, and expectations of an ever-changing work environment. They seek counselors, mentors, and other experts to assist in the planning and execution of education and career plans.

4. **Apply technology to enhance productivity.**
   Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring and using new technology. They understand the inherent risks - personal and organizational - of technology applications, and they take actions to prevent or mitigate these risks.

5. **Utilize critical thinking to make sense of problems and persevere in solving them.**
   Career-ready individuals recognize problems in the workplace, understand the nature of the problems, and devise effective plans to solve the problems. They thoughtfully investigate the root cause of a problem prior to
introducing solutions. They carefully consider options to solve a problem and, once agreed upon, follow through to ensure the problem is resolved.

6. **Practice personal health and understand financial literacy.**
Career-ready individuals understand the relationship between personal health and workplace performance. They contribute to their personal well-being through a healthy diet, regular exercise, and mental health activities. Career-ready individuals also understand that financial literacy leads to a secure future that enables career success.

7. **Act as a responsible citizen in the workplace and the community.**
Career-ready individuals understand the obligations and responsibilities of being a member of a community and demonstrate this understanding every day through their interactions with others. They are aware of the impacts of their decisions on others and the environment around them, and they think about the short-term and long-term consequences of their actions. They are reliable and consistent in going beyond minimum expectations and in participating in activities that serve the greater good.

8. **Model integrity, ethical leadership, and effective management.**
Career-ready individuals consistently act in ways that align with personal and community-held ideals and principles. They employ ethical behaviors and actions that positively influence others. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the direction and actions of a team or organization, and they recognize the short-term and long-term effects that management’s actions and attitudes can have on productivity, morale, and organizational culture.

9. **Work productively in teams while integrating cultural and global competence.**
Career-ready individuals contribute positively to every team, as both team leaders and team members. To avoid barriers to productive and positive interaction, they apply an awareness of cultural differences. They interact effectively and sensitively with all members of the team and find ways to increase the engagement and contribution of other members.

10. **Demonstrate creativity and innovation.**
Career-ready individuals recommend ideas that solve problems in new and different ways and contribute to the improvement of the organization. They consider unconventional ideas and suggestions by others as solutions to issues, tasks, or problems. They discern which ideas and suggestions may have the greatest value. They seek new methods, practices, and ideas from a variety of sources and apply those ideas to their own workplace practices.

11. **Employ valid and reliable research strategies.**
Career-ready individuals employ research practices to plan and carry out investigations, create solutions, and keep abreast of the most current findings related to workplace environments and practices. They use a reliable research process to search for new information and confirm the validity of sources when considering the use and adoption of external information or practices.

12. **Understand the environmental, social, and economic impacts of decisions.**
Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact other people, organizations, the workplace, and the environment. They are aware of and utilize new technologies, understandings, procedures, and materials and adhere to regulations affecting the nature of their work. They are cognizant of impacts on the social condition, environment, workplace, and profitability of the organization.

**COURSE CONTENT AND SUGGESTED TIME ALLOTMENT:**
Content sequencing, activities, and time allocations are only suggestions and may be adjusted to suit school site curriculum plans, available materials, and student needs.
Unit 1: Functions Overview: Power, Polynomial, Rational, Exponential and Logarithmic

Duration: 37 days

Description:
In this unit, students extend their knowledge of functions and models. Students analyze functions and their properties including domain and range, continuity, symmetry, increasing and decreasing, extrema, and boundedness/limits. Parent functions are reviewed and applied to piece-wise functions. Students combine functions algebraically and determine inverses of non-linear functions. Students review and extend their knowledge of the algebra and geometry of transformations. Power functions are connected to direct and inverse proportional relationships. Students extend their knowledge of exponential and logarithmic functions. The properties of logarithms are applied to solutions of exponential and logarithmic equations. The change of base rule is used to evaluate logarithmic expressions. Real-world data is modeled by exponential and logarithmic functions.

Required Assignment:
Representing Functions of Everyday Situations
http://map.mathshell.org/lessons.php?unit=9260&collection=8
This lesson is intended to assess how well students are able to 1) articulate verbally the relationships between variables arising in everyday contexts, 2) translate between everyday situations and sketch graphs of relationships between variables, 3) interpret algebraic functions in terms of the contexts in which they arise, and 4) reflect on the domains of everyday functions and in particular whether they should be discrete or continuous. Before the lesson, students work alone on a task designed to reveal their current understanding. The teacher reviews their solutions and creates questions for them to consider to help improve their work. In the lesson, students work in small groups on a collaborative task, matching each situation to a sketch of the graph, and to an algebraic function. They refine the graphs and interpret the formulas to answer questions. Students then discuss as a whole-class what has been learned and the strategies used. In a follow-up lesson, students review their responses to the original task and the questions posed. They use what they have learned to complete a similar task; Another Four Situations.

Materials: Glencoe Precalculus text: Chapters 1, 2, and 3


Unit 2: Trigonometric Functions, Identities and Equations

Duration: 34 days

Description:
In this unit, students extend their knowledge of angles to rotational angles in the plane and radian measure. The six trigonometric functions are defined in terms of a right triangle. The circular functions related to the unit circle and their relationship to the trigonometric functions are explored, as well as the relationship between functions of angles and functions of real numbers. Students will analyze the properties and graphs of trigonometric and circular functions and apply those functions to real-world problems. Inverse trigonometric and circular functions are studied. The trigonometric identities are derived and used to simplify expressions and prove other identities. Real world problems are modeled and solved using trigonometric equations. Students derive and apply the laws of sines and cosines to non-right triangles.

Required Assignment:
Representing Trigonometric Functions
http://map.mathshell.org/lessons.php?unit=9255&collection=8
This lesson is intended to assess how well students are able to 1) model a periodic situation, the height of a person on a Ferris wheel, using trigonometric functions, and 2) interpret the constants \(a, b, c\) in the formula \(h =\)
a + b \cos ct in terms of the physical situation, where \( h \) is the height of the person above the ground and \( t \) is the elapsed time. Before the lesson, students attempt the assessment task individually. The teacher then reviews their solutions and formulates questions for students to answer in order for them to improve their work. In the lesson, students engage in pairs or threes on a related card-matching task which requires students to match a graph to a function and a description of the placement of a Ferris wheel. Throughout their work they justify and explain their decisions to peers. In a whole-class discussion, students explain and extend their solutions and methods. Finally, students work alone on a task similar to the assessment task.

**Materials:** Glencoe Precalculus text: Chapters 4 and 5


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**Unit 3:** Systems of Equations, Matrices, and Vectors

**Duration:** 27 days

**Description:**
Students start Unit 3 multiplying matrices, finding their determinants and inverses, and using matrices, when possible, to solve three-by-three systems of equations. Technology plays an important role when solving these complicated problems. After matrices, students define vector quantities in component form and using magnitude and direction. Operations such as addition, subtraction, and scalar multiplication are performed algebraically. The dot product is applied to determine whether two vectors are perpendicular. Students find cross products and vectors in space. The cross products are used to find area and volume. Students study three-dimensional space using vectors and solve for the volume of a parallelepiped.

**Required Assignment:**
**Maximizing Profits: Selling Boomerangs**
http://map.mathshell.org/lessons.php?unit=9205&collection=8

This lesson is intended to assess how well students are able to 1) interpret a situation and represent the constraints and variables mathematically, 2) select appropriate mathematical methods to use, 3) explore the effects of systematically varying the constraints, 4) interpret and evaluate generated data and identify the optimum case, check it for confirmation, and 5) communicate their reasoning clearly. This lesson is designed to help students develop strategies for solving optimization problems. Such problems typically involve using limited resources to greatest effect, as in, for example, the allocation of time and materials to maximize profit. Before the lesson, students attempt the problem individually. You then review their work and formulate questions for students to answer in order to improve their solutions. At the start of the lesson, students work alone answering your questions. Students are then grouped and engage in a collaborative discussion of the same task. In the same small groups, students are given sample solutions to comment on and evaluate. In a whole-class discussion, students explain and compare solution strategies seen and used. Finally, students revise their individual solutions and comment on what they have learned.

**Materials:** Glencoe Precalculus text: Chapters 6 and 8

**Standards Addressed:** CCSS-M Clusters N-VM.A, N-VM.B, N-VM.C, A-REI.C

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**Unit 4:** Conic Sections, Parametric Equations, Polar Coordinates and Complex Numbers

**Duration:** 30 days

**Description:**
Students will analyze, graph, rotate, and write equations of parabolas, circles, ellipses and hyperbolas.
Students will be able to identify a conic using only its equation. Parametric equations are defined, analyzed, and graphed. Equivalent forms of parametric and rectangular equations are determined. Parametric equations are applied to motion in the plane. Never before seen by the students, they will learn to graph polar coordinates and polar curves, and convert from polar form to rectangular form and back. Students will identify conics expressed in polar form and graph the conic given its eccentricity and the equation of its directrix. Working with complex numbers, students will convert between polar and rectangular form, and find products, quotients, powers, and roots of complex numbers in polar form.

**Materials:** Glencoe Precalculus text: Chapters 7 and 9

**Standards Addressed:** CCSS-M Clusters N-CN.A, N-CN.B, F-IF.C, G-GPE.A, G-GMD.A

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**Unit 5: Sequences and Series**

**Duration:** 17 days

**Description:**
After a review of the notation and properties of arithmetic and geometric sequences and series, using sigma notation to represent the sum of a series, students will use mathematical induction to prove summation formulas and properties of divisibility involving a positive integer $n$. Also new for the students in this unit is the Binomial Theorem which will be used, in addition to Pascal's Triangle, to write binomial expansions. A power series will be used to represent a rational function and to approximate values of transcendental functions.

**Materials:** Glencoe Precalculus text: Chapter 10

**Standards Addressed:** CCSS-M Clusters A-SSE.B, F-IF.A, F-BF.A, F-LE.A

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**Unit 6: Limits and Derivatives**

**Duration:** 24 days

**Description:**
Unit 6 brings us in the truest sense to Pre-calculus. Students work on skills that will be directly and explicitly seen in Calculus. Students have seen limits before in this class as functions approaching asymptotes; here they will estimate and evaluate limits of functions not only at infinity, but at selected points. Using lines tangent to functions, students find instantaneous rates of change (velocity) which leads into the calculation of derivatives. Leading us to integration, students use rectangles to approximate the area under a curve. Student approximations become more exact using definite integrals and integration. The unit ends with students finding antiderivatives and using the Fundamental Theorem of Calculus.

**Materials:** Glencoe Precalculus text: Chapter 12

**Standards Addressed:** Selected Calculus Standards

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**INSTRUCTIONAL METHOD AND/OR STRATEGIES:**
A variety of instructional strategies will be utilized to accommodate all learning styles. See the “Using Formative Assessment to Address the Specific Learning Needs of Low Achieving Students, High Achieving Students, Students with Disabilities and English Language Learners in K-12 MATHEMATICS” document.
COURSE MATERIALS:

Core Text: Precalculus, Carter, et. al., Glencoe, © 2014
Supplemental Materials: In addition to the basic text, a variety of instructional tools will be used to meet the needs of all students.

RESOURCES:

Documents
- LBUSD Scope and Sequence ................................................................. LBUSD Mathematics Webpage
- LBUSD Unit Guides ............................................................................. LBUSD Mathematics Webpage
- LBUSD Instructional Tools ...................................................... LBUSD Mathematics Curriculum Intranet
- Using Formative Assessment for Differentiation...... LBUSD Math/ELA Curriculum Documents
- Work-Based Learning Continuum ............................................. LBUSD Work-Based Learning Webpage
- ELD Standards ................................................................................. http://www.cde.ca.gov/sp/el/er/eldstandards.asp

District Offices
- Math Curriculum Office ........................................................................ (562) 997-8000, ext. 2962
- Research Office ......................................................................................... (562) 997-8143

PERFORMANCE CRITERIA:
Defines how good is good enough on which measures to demonstrate achievement of content standards.

Classroom Performance Standards
The objective of instruction is to help all students achieve at or above the Proficient Level and receive a C or better in the course.

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>D</th>
<th>C</th>
<th>B</th>
<th>A</th>
</tr>
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<tbody>
<tr>
<td>Assessments</td>
<td>0 – 59%</td>
<td>60 – 69%</td>
<td>70 – 79%</td>
<td>80 – 89%</td>
<td>90 – 100%</td>
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<td>Unit Tests</td>
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<td>Chapter Tests</td>
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<tr>
<td>Quizzes</td>
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</tr>
<tr>
<td>Classwork</td>
<td>0 – 59%</td>
<td>60 – 69%</td>
<td>70 – 79%</td>
<td>80 – 89%</td>
<td>90 – 100%</td>
</tr>
<tr>
<td>Homework</td>
<td>0 – 59%</td>
<td>60 – 69%</td>
<td>70 – 79%</td>
<td>80 – 89%</td>
<td>90 – 100%</td>
</tr>
</tbody>
</table>

Standard Grading Scale:

A  90 – 100%
B  80 – 89%
C  70 – 79%
D  60 – 69%
F  0 – 59%

Suggested Grade Weighting:

1. Assessment  60 – 80%

Graded work assessing a student’s mastery of mathematics such as any of the following:
- Tests (district exams and classroom tests)
- Quizzes
- Project work that assesses a student’s understanding
2. Classwork/Activities  
Graded work completed in class such as any of the following:
  o In class assignments
  o Project work completed in class
  o Notes
  o Warm-ups
  o Graded participation

3. Homework  
Graded work completed outside of class such as any of the following:
  o Assignments
  o Project work completed outside of class

Submitted by: Becky Afghani  
Submission Date: August 24, 2015  
School/Office: Math Curriculum Office  

Original Board Approval Date: November 3, 2015  
Revised Board Approval Date: