Department: Mathematics
Course Title: Advanced Algebra and Trigonometry
Level and/or Grade: Standard/Grade 11/12
Prerequisite: Passing Grade in Algebra 2

Course Description:
This is an alternative to Pre Calculus. This course revisits College and Career Readiness standards commonly found on the SAT’s as well as new content. It blends advanced algebra topics with an introduction to the trigonometry of Pre Calculus. The course provides students with a strong foundation for more advanced work connecting algebraic functions, their relationships, properties and graphs, and places an emphasis on trigonometry, matrices, and networks.

Learning Standards*: Through communication, representation, reasoning, making connections, and problem solving, students will be able to...

Mathematical Practice:
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Number and Quantity:
- Extend the properties of exponents to rational exponents.
- Perform arithmetic operations with complex numbers.
- Represent complex numbers and operations in the plane.
- Use complex numbers in polynomial identities and equations.
- Represent and model with vector quantities.
- Perform operations on matrices.
- Use matrices in applications.

Algebra:
- Perform arithmetic operations on polynomials
- Understand the relationship between zeros and factors of polynomials.
- Use polynomial identities to solve problems
- Rewrite rational expressions.
- Represent and solve equations and inequalities graphically.
- Know and apply the Binomial Theorem.
- Rewrite rational expressions.
- Solve systems of equations.
Functions:
- Interpret functions that arise in applications in terms of a context.
- Analyze functions using different representations.
- Build a function that models a relationship between two quantities.
- Build new functions from existing functions.
- Construct and compare linear, quadratic, and exponential models and solve problems.
- Extend the domain of trigonometric functions using the unit circle.
- Model periodic phenomena with trigonometric functions.
- Prove and apply trigonometric identities.
- Graph functions by hand that expressed symbolically and identify zeros, asymptotes when appropriate and show end-behavior.
- Find inverse functions; understand the relationship between exponents and logarithms.
- Extend the domain of trigonometric functions using the unit circle.
- Model periodic phenomena with trigonometric functions.
- Prove and apply trigonometric identities to solve problems.

Geometry:
- Apply trigonometry to general triangles.
- Prove the Laws of Sines and Cosines and apply to find unknown measures in right and non-right triangles.
- Translate between the geometric description and the equation for the conic section.
- Use equations and graphs of conic sections to solve real-world problems.

Statistics and Probability
- Summarize, represent and interpret data on a single count of measurement variable.
- Understand and evaluate random processes underlying statistical experiments.
- Make inferences and justify conclusions from sample surveys, experiments and observational studies.

*from the 2011 Massachusetts Curriculum Framework for Mathematics

Course Alignment with 21st Century Learning Expectations:

Students will…
1. Become self-directed learners as they
   - Set goals and responsibility for learning.
   - Select strategies for problem solving.
   - Monitor one’s own learning through reflection.
2. Communicate effectively as they
   - Express ideas precisely and with coherence.
   - Use a variety of representations to express mathematics to multiple audiences.
   - Use appropriate vocabulary and symbolic notation effectively.
3. Apply problem-solving skills and critical and creative thinking as they
   - Apply mathematical knowledge to new, non-routine situations.
   - Evaluate and test different routes to solving a problem.
   - Demonstrate persistence.
4. Use technology appropriately as a tool for learning, collaboration, presentation, research, and design as they
   - Demonstrate proficiency with the graphing calculator as a tool for learning.
   - Communicate and collaborate with educators and peers using online systems.
   - Use technology strategically for independent learning, calculation and representation.
5. Act with integrity, respect and responsibility toward themselves, others, and the environment as they
   - Actively participate in class and demonstrates respectful behavior.
• Respond to new and diverse perspectives.
• Critique the work of others and accept the critique of others.

6. Exhibit flexibility and adaptability as they
• Recognize mistakes as an essential part of learning.
• Revise thinking to apply in context.
• Approach new experiences with confidence.

7. Collaborate in diverse groups to share knowledge, build consensus, and achieve goals as they
• Work in pairs and small groups to discuss and problem solve.
• Construct team positive interactions.
• Discuss a variety of viewpoints and demonstrate logical reasoning to make decisions.

8. Practice leadership in and service to their community as they
• Support their peers in learning mathematics.
• Participate in departmental activities that promote the understanding mathematics.
• Use mathematical models to solve community problems.

9. Become contributing citizens in a global society as they
• Understand the role of mathematics in shaping the world.
• Exchange ideas and resources beyond the classroom.
• Make career choices that positively impact future of the mathematical learning.

Assessment:

• See attached grading policy.