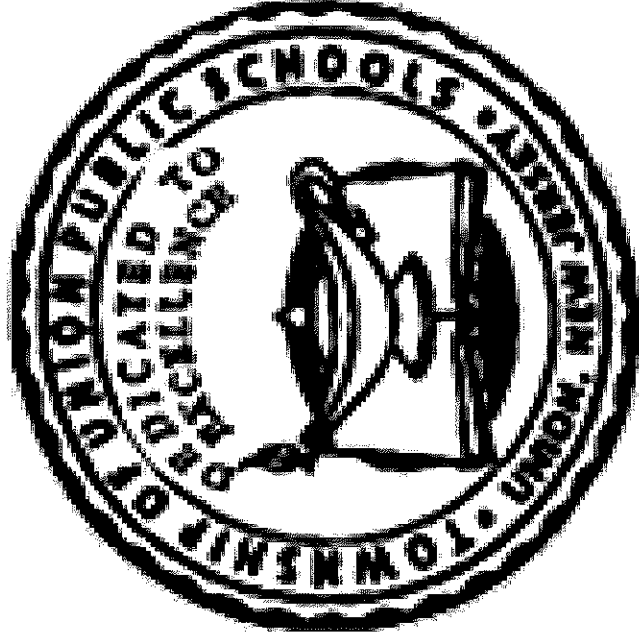


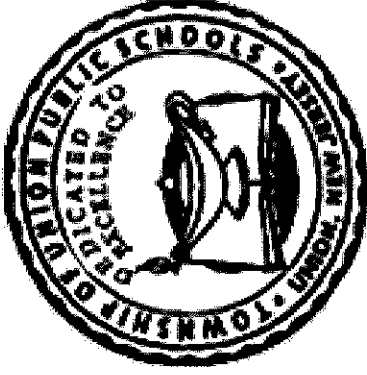
TOWNSHIP OF UNION PUBLIC SCHOOLS



MA550 AP Calculus

Curriculum Guide 2015

Curriculum Guide Approved June 2015



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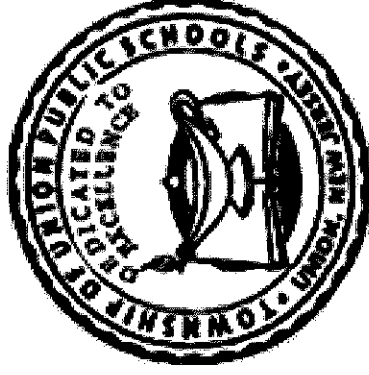
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TOWNSHIP OF UNION PUBLIC SCHOOLS
Administration

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Assistant Superintendent **Dr. Noreen Lishak**

Director of Curriculum K-12 **Dr. Noreen Lishak**

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DEPARTMENT SUPERVISORS

Language Arts/Social Studies 3-5	Mr. Robert Ghiretti
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Guidance K-12/SAC	Ms. Nicole Ahern
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Math 7-12.....	Mr. Jason Mauriello
Science 6-12.....	Ms. Maureen Guilfoyle
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Art/Music	Mr. Ronald Rago

Curriculum Committee

Sherri Horn mathematics teacher at Union High School
Joe Kohan mathematics teacher at Union High School

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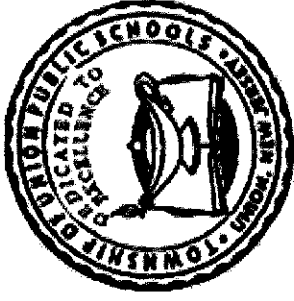
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District Mission Statement

The Township of Union Board of Education believes that every child is entitled to an education, designed to meet his or her individual needs, in an environment that is conducive to learning. State standards, federal and state mandates, and local goals and objectives, along with community input, must be reviewed and evaluated on a regular basis to ensure that an atmosphere of learning is both encouraged and implemented. Furthermore, any disruption to or interference with a healthy and safe educational environment must be addressed, corrected, or, when necessary, removed, in order for the district to maintain the appropriate educational setting.

District Philosophy Statement

The Township of Union Public School District, as a societal agency, reflects democratic ideals and concepts through its educational practices. It is the belief of the Board of Education that a primary function of the Township of Union Public School System is the formulation of a learning climate conducive to the needs of all students in general, providing therein for individual differences. The school operates as a partner with the home and community.



Statement of District Goals

- ❖ Develop reading, writing, speaking, listening, and mathematical skills.
- ❖ Develop a pride in work and a feeling of self-worth, self-reliance, and self discipline.
- ❖ Acquire and use the skills and habits involved in critical and constructive thinking.
- ❖ Develop a code of behavior based on moral and ethical principals.
- ❖ To be able to work with others cooperatively.
- ❖ Acquire a knowledge and appreciation of the historical record of human achievement and failures and current societal issues.
- ❖ Acquire a knowledge and understanding of the physical and biological sciences.
- ❖ Efficient and effective participation in economic life and the development of skills to enter a specific field of work.
- ❖ Appreciate and understand literature, art, music, and other cultural activities.
- ❖ Develop an understanding of the historical and cultural heritage.
- ❖ Develop a concern for the proper use and/or preservation of natural resources.
- ❖ Develop basic skills in sports and other forms of recreation.

Course Description

This AP Calculus is a school year of course work comparable to a first semester calculus course in a college or university. The goal is to prepare students to take the AP Calculus AB exam for college placement or credit. The course standards will be updated as the AP exam evolves to cover more or different topics. Some prerequisite trigonometric and function topics will be reviewed at the start. Differential and integral calculus will follow. There will be a multirepresentational approach with concepts and results expressed graphically, numerically, analytically and verbally. Connections among the representations will be stressed. Technology will be used regularly throughout to reinforce relationships among representations, interpret results and to confirm written work. Derivatives, integrals, limits, approximations, applications and modeling will be covered.

Recommended Textbooks

**Calculus of a Single Variable by Larson, Hostellar, Edwards
(Houghton Mifflin)**

Copies of past AP Calculus AB exams will be used to study

Course Proficiencies

SWBT:

- 1) Perform transformations of and graph functions.**
- 2) Perform tests of limits and continuity.**
- 3) Compute derivatives and apply to sketching graphs and word problems.**
- 4) Find antiderivatives and apply to areas and volumes and accumulation of change problems.**
- 5) Know and apply the main theorems of calculus.**

Curriculum Units

1) Functions & Graphs 2) Limits 3) Theorems 4) Derivatives 5) Integrals

Unit 1: FUNCTIONS & GRAPHS

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING CCSS
1	Use knowledge of even and odd functions to predict graphical behavior	
2	Use knowledge of leading exponents to discuss end behavior of a function	
3	Use knowledge of intercepts and asymptotes to describe a graph over an interval	
4	Demonstrate removable and nonremovable discontinuities graphically and algebraically	
5	Explore properties of oscillating graphs	
6	Review trigonometric functions and the unit circle	

CCSS #	Assessments
	Considering intercepts, asymptotes, end behavior and symmetry construct a reasonably accurate graph
	Use graphing calculator to verify conjectures
	Show that if a function is continuous and has no zeros it is always positive or always negative
	Compare relative magnitudes of functions and their rates of change using exponential, logarithmic and polynomial samples

Unit 2: LIMITS

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING CCSS
1	Calculate limits algebraically	
2	Estimate limits, including one-sided, from a graph or table	
3	Describe asymptotic behavior in terms of limits, including infinity	
4	Use L'Hospital's Rule (after section on Derivatives) for indeterminate forms	
5	Explain squeeze theorem	
6	Define a tangent line as the best linear approximation of a curve	

CCSS #	Assessments
	Complete delta/ epsilon proofs
	Prove functions continuous using limits
	Use knowledge of limits to explain why limit of $(\sin(x)/x)$ as x approaches 0 is 1
	Explain limits of piece-wise functions
	On graphing calculator make tables of values for limit conjectures

Unit 3: EXISTENCE THEOREMS

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING CCSS
1	Use intermediate value theorem to find desired values	
2	Utilize extreme value theorem to verify existence of a value	
3	Compare traits of functions that do not meet requirements of fundamental theorems	
4	State and use the mean value theorem	
5	State and use Rolle's theorem	

CCSS #	Assessments
	Give a geometric interpretation of the mean value, Rolle, extreme value and intermediate value theorems
	Find the average value of a function and give a picture of the corresponding rectangle
	Solve real life mean value word problems verifying the existence of an existing speed

Unit 4: DERIVATIVES

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING CCSS
1	Compute a derivative using the limit definition	
2	Use power, product, quotient and chain rules to find derivatives and higher order derivatives algebraically	
3	Compute derivative of exponential, logarithmic, trigonometric and inverse trig functions	
4	Interpret derivative as instantaneous rate of change and slope of a tangent line	
5	Use implicit and logarithmic differentiation	
6	Find extrema and points of inflection.	

CCSS #	Assessments
	Explore slope field and solution curves for differential equations
	Determine increasing, decreasing, concave up and concave down areas of a curve
	Solve related rates and optimization problems
	Write the equation of a tangent and normal line to a curve
	Solve velocity and acceleration problems

Unit 5: INTEGRALS

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING CCSS
1	Find left sided , right-sided and midpoint Riemann sums and trapezoidal sums and connect to the integral of a function	
2	Use Simpson's Rule to approximate area under a curve	
3	Use sum rules and sigma notation	
4	Use the fundamental theorem of calculus, antiderivatives that come from derivatives of basic functions and substitution of variables to find antiderivatives	
5	Find area under a curve and between 2 curves	
6	Find volume of a revolution by shell, disk and washer method and of a solid with known cross section	

CCSS #	Assessments
	Solve word problems using integration as an accumulation of change from a rate of change
	Explore length of a smooth curve and area of a surface of revolution using integration
	Do work problems using a constant variable force
	Apply integration to motion on a line
	Solve separable differential equations

Pacing Guide – Course

Units 1-3 Function, graphs, theorems and limits	40 days
Unit 4 Derivatives	70 days
Unit 5 Integrals	70 days