CHILLICOTHE
HIGH SCHOOL

Advanced Mathematics Syllabus
CHS Mathematics Department

Contact Information: Parents may contact me by phone, email, or visiting the school.
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- Google Classroom

CCSD Vision Statement: The Chillicothe City School District will provide tomorrow's leaders with a high quality education by developing high expectations and positive personal relationships among students, staff, and community members.

CCSD Mission Statement: The Chillicothe City School District empowers students to learn, to lead, and to serve.

Course Description and Prerequisite(s) from Course Handbook:
Advanced Mathematics - 266
State Course #: 110099
Prerequisite: At least a "B+" in Algebra II or "B-" in Honors Algebra II and teacher approval
Required Option Grade: 11-12
Graded Conventionally Credit: .5
Course Description:

This course is designed for college bound students. The major topics include functions and their graphs, solving equations and inequalities, polynomial functions, rational and radical equations, logarithms and exponential functions, complex numbers, matrices, and sequences. Analyzing, interpreting and using technology to solve problems will be emphasized.

Learning Targets: Defined below for clarity are the Unit Titles, Big Ideas of every Unit taught during this course, and the Essential Questions to be answered to better understand the Big Ideas. A student's ability to grasp and answer the

Essential Questions will define whether or not he or she adequately learns and can apply the skills found in Big Ideas. This will ultimately define whether or not a student scores well on assessments administered for this course.

- 1st or 3rd Quarter
  - Unit I Title: Functions and Graphs
    - Big Idea #1: I can use numerical, algebraic, and graphical models to solve problems and represent function as well as translate from one model to another
      - *Essential Question #1:* How are models helpful in solving problems and which model numerical, algebraic, or graphical is most useful?
      - *Essential Question #2:* Why is it important to be able to transfer from numerical, algebraic, and graphical models?
    - Big Idea #2: I can determine the domain and range for functions, analyze function characteristics and represent function transformations both algebraically and graphically.
      - *Essential Question #1:* How do you analyze a function?
      - *Essential Question #2:* How are transformations represented algebraically?
      - *Essential Question #3:* How can a function be graphed given a parent function and a transformed equation of the parent function?
    - Big Idea #3: I can build functions from functions.
      - *Essential Question #1:* How do you add, subtract, multiply, and divide functions?
      - *Essential Question #2:* What is a composition function and why are they important?
      - *Essential Question #3:* How is an invertible function produced from a non-invertible function by restricting the domain?
    - Big Idea #4: I can define parametric relations and understand when functions are inverses.
      - *Essential Question #1:* How is the pair (x,y) found for a given value of the parameter?
      - *Essential Question #2:* How are the values read of an inverse function from a graph or a table, given that the function has an inverse?
      - *Essential Question #3:* How are composition functions used to prove functions are inverses?
  - Unit II Title: Polynomial, Power, and Rational Functions
    - Big Idea #1: I can model linear and quadratic functions.

- *Essential Question #1:* What do the equation and graph of a polynomial function look like?
- *Essential Question #2:* How are linear functions analyzed and sketched?
- *Essential Question #3:* What do the equation and graph of a quadratic function look like?
- *Essential Question #4:* How are quadratic functions analyzed and sketched?

▪ **Big Idea #2:** I can model and analyze power functions.
- *Essential Question #1:* What do the equation and graph of a power function look like?
- *Essential Question #2:* How are power functions analyzed and sketched?

▪ **Big Idea #3:** I can model polynomial functions of higher degree.
- *Essential Question #1:* What do the equation and graph of a polynomial function look like?
- *Essential Question #2:* How are polynomial functions analyzed and sketched?

▪ **Big Idea #4:** I can identify and locate zeroes of polynomial functions.
- *Essential Question #1:* How are polynomials divided to write a summary statement?
- *Essential Question #2:* How are all of the potential rational zeros and actual zeros found?
- *Essential Question #3:* What does the Remainder Theorem do and why is it important?

▪ **Big Idea #5:** I can graph, analyze, and solve rational functions.
- *Essential Question #1:* What do the equation and graph of a rational function look like?
- *Essential Question #2:* How are rational functions analyzed and sketched?
- *Essential Question #3:* How are rational equations and inequalities solved?

▪ **Big Idea #6:** I can solve inequalities in one variable.
- *Essential Question #1:* What is an extraneous solution and how are the determined?
- *Essential Question #2:* How are rational equations solved?
- *Essential Question #3:* How are rational equations applied to the real world?
- *Essential Question #4:* How are rational inequalities solved?
- *Essential Question #5:* How are rational inequalities applied to the real world?

        - *Essential Question #6:* How can knowing how to solve rational inequalities be applied to solving other inequalities?

- <u>2nd or 4th Quarter</u>
    - **Unit III Title: Exponential, Logistic, and Logarithmic Functions**
        - **Big Idea #1:** I can model and analyze exponential, logistic, and logarithmic functions.
            - *Essential Question #1:* How are exponential functions analyzed and sketched?
            - *Essential Question #2:* How are logistic functions analyzed and sketched?
            - *Essential Question #3:* What is the relationship between exponents and logarithms?
            - *Essential Question #4:* How can the relationship between exponents and logarithms be used to solve problems involving logarithms and exponents?
            - *Essential Question #5:* How are logarithmic functions analyzed and sketched?
        - **Big Idea #2:** I can use and apply the properties of logarithmic functions.
            - *Essential Question #1:* What are the main properties of logarithms?
            - *Essential Question #2:* How can the properties of logarithms be applied to solve problems?
        - **Big Idea #3:** I can solve and model exponential and logarithmic equations.
            - *Essential Question #1:* How are exponential equations solved?
            - *Essential Question #2:* How are logarithmic equations solved?
    - **Unit IV Title: Systems and Matrices**
        - **Big Idea #1:** I can solve systems of two equations and inequalities.
            - *Essential Question #1:* How is a system of equations and inequalities solved graphically?
            - *Essential Question #2:* What methods can be used to solve a system of equations and inequalities *algebraically?*
            - *Essential Question #3:* How can systems of equations and inequalities be used in the real-world?
        - **Big Idea #2:** I can use matrix algebra to manipulate and model data.
            - *Essential Question #1:* How can matrices be used to represent and manipulate data?

- *Essential Question #2:* When would matrices be multiplied scalars to produce new matrices and how are matrices multiplied scalars to produce new matrices?
- *Essential Question #3:* When and how are matrices of appropriate dimensions added, subtracted, and multiplied?
- *Essential Question #4:* What properties does matrix multiplication for square matrices satisfy, and which properties are not satisfied and why?
- *Essential Question #5:* How do zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers?
- *Essential Question #6: What is the role of the determinant and how is one found?*

▪ **Big Idea #3:** I can solve systems of equations using matrices.
- *Essential Question #1:* When and how can a single matrix equation in a vector variable be represented as a system of linear equations?
- *Essential Question #2:* How is the inverse of a matrix if it exists found and used to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater)?

▪ **Big Idea #4:** I can decompose partial fractions and use them to them to sketch graphs.
- *Essential Question #1:* What is meant by partial fraction decomposition?
- *Essential Question #2:* How is partial fraction decomposition found algebraically?

- **END OF COURSE EXAM**

Course Materials:
- Google Chromebook
- Lined notebook paper
- Graph paper
- Folder to keep notes/papers in
- TI-84+C Calculator is highly recommended but not required

Textbook:
Waits, Bert K., Gregory D. Foley, and Daniel Kennedy. *Precalculus: Graphical, Numerical, Algebraic*. 8th ed. N.p.: Pearson, 2011. Print.

Electronic Resources:
- Google Classroom
- Khan Academy https://www.khanacademy.org/

- Purplemath http://www.purplemath.com/modules/index.htm

Course Expectations:

- This course will require dedication and a strong effort. What you put into Advanced Math is exactly what you will get out of it. Advanced Math is not only a building block for your subsequent math courses, but also the fourth half-credit math course on your high school transcript, which means it affects your high school GPA. Grades are earned in this classroom and I am there to help you earn the best grade possible. This classroom is a partnership and will only work if we all work together. I am always available for extra help after school or through email. We will move at a quick pace through our syllabus so it is vital that you keep up with notes and assignments. I am looking forward to this school year and getting to know all of you!

Grading:

Unit Exams	50%
Assessments (Including: Quizzes, Essays, Labs, and Projects)	30%
Class work/Homework	20%

- Each nine week's grade comprises 40% of a student's final grade.
- The End of Course Exam comprises 20% of a student's final grade.

Grading Scale:

The grading scale for Chillicothe High School can be found in the student handbook or online at http://www.chillicothe.k12.oh.us/1/Content2/studenthandboook.

Late Work: Late work will be subject to the Board-adopted policy on assignments that are submitted late (to be reviewed in class).

- Regardless of the absence type (excused or unexcused), students will be expected to make up work and be held accountable for learning all material they missed.
- Any student who is absent from school (excused or unexcused) will have one (1) additional day for every day they missed, to make up his/her work for full credit (100%).
- Any student who exceeds the allotted time to turn in an assignment for full credit may still turn in late work for partial credit.
    - Any student who turns in work up to 1 week late must at least be given the opportunity to earn 75% on that assignment.
    - Any student who turns in work between 1 and 2 weeks late must at least be given the opportunity to earn 60% on that assignment.
- The end of the 9 weeks is the cut off point for teachers to accept late work from students for full or partial credit, unless the teacher decides to give the student an incomplete for the 9 weeks due to extenuating circumstances.

Performance Based Section: Writing Assignments/Exams/Presentations/Technology

One or more of the End of Unit Exams may be Performance Based. According to the Ohio Department of Education, "Performance Based Assessments (PBA) provides authentic ways for students to demonstrate and apply their understanding of the content and skills within the standards. The performance based assessments will provide formative and summative information to inform instructional decision-making and help students move forward on their trajectory of learning." Some examples of Performance Based Assessments include but are not limited to portfolios, experiments, group projects, demonstrations, essays, and presentations.

CHS Advanced Mathematics Course Syllabus

After you have reviewed the preceding packet of information with your parent(s) or guardian(s), please sign this sheet and return it to me so that I can verify you understand what I expect out of each and every one of my students.

Student Name (please print): _____

Student Signature: _____

Parent/Guardian Name (please print): _____

Parent/Guardian Signature: _____

Date: _____