

# Peddie Summer Day School

## Course Syllabus: PreCalculus Honors for Credit

Textbook: *Precalculus with Limits: A Graphing Approach*, High School Edition, 6th Edition by Ron Larson; ISBN-10: 1-111-42764-X; ISBN-13: 978-1-111-42764-1

**Function library:** (linear, polynomials, rational) and their translations: graphing, inverses, roots, number sets (*3days*)

- Find and use the slope of a line to write and graph linear equations.
- Evaluate functions and find their domains.
- Analyze graphs of functions.
- Identify and graph shifts, reflections, and non-rigid transformations of functions.
- Find arithmetic combinations and compositions of functions.
- Find inverse functions graphically and algebraically.
- Use scatter plots and a graphing utility to find linear models for data.
- Sketch and analyze graphs of quadratic and polynomial functions.
- Use long division and synthetic division to divide polynomials by other polynomials.
- Determine numbers of rational and real zeros of polynomial functions, and find the zeros.
- Perform operations with complex numbers and plot complex numbers in the complex plane.
- Determine the domains, find the asymptotes, and sketch the graphs of rational functions.
- Classify scatter plots and use a graphing utility to find quadratic models for data.

**Exponential and Logarithmic Functions:** properties, graphing, solving (*3days*)

- Recognize, evaluate, and graph exponential and logarithmic functions.
- Rewrite logarithmic functions with different bases.
- Use properties of logarithms to evaluate, rewrite, expand, or condense logarithmic expressions.
- Solve exponential and logarithmic equations.
- Use exponential growth models, exponential decay models, Gaussian models, logistic models, and logarithmic models to solve real-life problems.
- Fit exponential, logarithmic, power, and logistic models to sets of data.

**Trigonometric Functions:** radians, unit circle, graphs of six functions (*2days*)

- Describe an angle and convert between degree and radian measure.
- Identify a unit circle and describe its relationship to real numbers.
- Evaluate trigonometric functions of any angle.
- Use fundamental trigonometric identities.
- Use fundamental trig identities.
- Sketch graphs of trig functions.
- Evaluate inverse trig functions.
- Evaluate the compositions of trig function.
- Use trig functions to model and solve real-life problems.

**Analytic Trigonometry:** identities, solving, law of sine and cosine (*5days*)

- Use fundamental identities to evaluate trigonometric functions and simplify trigonometric expressions.

- Verify trigonometric identities.
- Use standard techniques and inverse trigonometric functions to solve trigonometric equations.
- Use sum and difference formulas, multiple-angle formulas, power-reducing formulas, half-angle formulas, and product-to-sum formulas to rewrite and evaluate trigonometric functions.
- Use the Law of Sines and Law of Cosines to solve oblique triangles.
- Find areas of oblique triangles.

**Vectors:** definition, dot product, three-dimensional coordinate system (*1.5days*)

- Draw vectors.
- Operations on vectors.
- Calculating the angle between two vectors

**Systems of Equations:** linear, matrices (*1day*)

- Solve systems of equations by graphing, substitution, elimination, matrices
- Operations on matrices by hand and with technology
- Inverse matrices

**Sequences and Series:** Arithmetic, Geometric (*3days*)

- Use summation notation to write a sequence.
- Recognize, write, and use arithmetic and geometric sequences.
- Use the Binomial Theorem and Pascal's Triangle.
- Use the Fundamental Counting Principle, permutations, and combinations.
- Venn diagrams and set theory.
- Find the probabilities of events.

**Analytic Geometry:** Conics, parametric, polar (*3days*)

- Recognize each conic shape.
- Write each conic in standard form and graph each.
- Use and graph given parametric equations.
- Rewrite rectangular equations to parametric equations and vice versa.
- Plot on the polar coordinate system.
- Convert rectangular coordinates to polar and vice versa.
- Graph polar equations.

**Limits:** definition, evaluating (*2days*)

- Estimate limits.
- Find exact limits using tables, graphs, and algebra.

**Slope of a Curve:** difference quotient, derivative (*2days*)

- Slope, tangent lines, and derivatives.

Day count above accounts for 5 weeks (26 class meetings). Throughout the course we will use the remaining four days (30 total class meetings) on reviewing, assessments that are longer than one hour in length and three exams which will be two hours each in length.