Textbook: Peter Tannenbaum. *Excursions in Modern Mathematics*. Pearson Education, 2004.
Course Specs: Full Year, 5.0 credits, open to students in grades 11 and 12.

Course Description: Discrete Mathematics is a full-year college preparatory course that will allow students to gain an appreciation of the subtlety and variety of mathematics. The topics are chosen with the purpose of introducing the student to a different view of mathematics from the one presented in a traditional general education mathematics curriculum. The course is focused on building a direct and immediate connection between the mathematics of our world and the concrete, real-life problems in which mathematics is realized.

Topic/Time Frame	**Content/Topics**
Descriptive Statistics and Voting – MP1	
SAT Testing Practice (once a week with other units during 1st quarter)	I. Identify weaknesses and strategies with official practice SAT tests (resource – College Board official SAT study guide) and SAT question of the Day
Statistics	I. Descriptive Statistics A. Graphical Descriptions of Data B. Numerical Summaries of Data C. Measures of Statistical Spread
The Mathematics of Social Choice	I. The Mathematics of Voting A. Preference Ballots and Preference Schedules B. Various types of voting methods II. Weighted Voting Systems and the Banzhaf Power Index A. Weighted Voting Systems and Dictators 1. The United Nations Security Council 2. The European Union 3. The United States Electoral College 4. Selected Project: As per the 2010 U.S. Census some of our electoral college's constituencies have gained/lost electoral votes. Research the amount of votes each constituency currently has, and locate or calculate the Banzhaf Power Index for each constituency.

Topic/Time Frame	Content/Topics
Social Choice and Statistics– MP2	
The Mathematics of Social Choice	III. Fair Division and Apportionment A. Applications of Fair Division and Apportionment 1. Methods of Fair Division 2. Apportionment Problems, Paradoxes, and Methods
Statistics and Probability	II. Collecting Statistical Data A. Surveys and Random Sampling B. Clinical Studies III. Chances, Probabilities, and Odds A. The multiplication rule B. Permutations and Combinations C. Probability Spaces
Growth and Networking– MP3	
Types of Growth	I. Spiral Growth in Nature A. Fibonacci Numbers: 1. Discovery of how the sequence is built 2. Discovery of the value that the Fibonacci sequence converges to B. The Golden Ratio 1. The golden ratio's occurrence in nature, art, and advertising 2. Selected Project – research a popular product that uses the golden ratio in its dimensions. Report on the product's dimensions, sales, market share, and overall success. C. Gnomons 1. Gnomonic growth as it applies to living things 2. Applications of gnomonic growth and similarity in geometry II. Population Growth A. Linear and Exponential Growth Models 1. Explicit and recursive description 2. Finding initial and missing terms in a sequence 3. Finding the sum of a series

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	4. Applications of compound interest
Management Science, Networking, and Scheduling	I. Euler Circuits and Paths A. Routing Problems B. Graph Terminology and Models C. Euler's and Fleury's Algorithms D. Selected Project – NYC Bridges and Tunnels: Design a bus tour over seventeen bridges and tunnels that connect NYC and NJ. Students are to determine if the tour can be conducted so that each bridge and tunnel is crossed exactly one, and whether or not they can finish where they started. E. Selected Project – The Great Kaliningrad Circus: Students are to design a traveling circus tour through twenty-one U.S. cities and apply at least one algorithm to determine the shortest distance to conduct the tour.
<u>Networking, Scheduling, and Symmetry – MP4</u>	
Accuplacer Testing Practice (once a week with other units during 4th quarter)	I. Identify weaknesses and strategies with practice Acculplacer tests (resource – College Board official Accuplacer sample tests and tests provided by colleges.)
Management Science, Networking, and Scheduling	I. Traveling Salesman Problems and Hamilton Circuits. A. Hamilton Circuits and Paths B. Weighted Graphs C. Traveling Salesman Problems and algorithms by which to solve them D. Selected Project – NYC Bridges and Tunnels extension: Determine which bridges and tunnels have tolls, and how much those tolls cost. Redevelop the graph into a weighted digraph and determine how to conduct the tour in the cheapest way possible. Also, determine what time of the day will take the most or least time, and what times of the day have the highest or lowest toll rates II. The Basic Elements of Scheduling A. Digraphs B. The Priority-List Model for Scheduling 1. Distinguish between processors, tasks, and end

Topic/Time Frame	Content/Topics
	results 2. Determine precedence relations 3. Selected Project - Design of a graduation party of wedding that incorporates all of the elements related to scheduling.
Symmetry	II. Symmetry A. Geometric Symmetry B. Geometric Transformations and their location in architecture and movement III. Fractal Geometry A. The Koch Snowflake and iterations that produce it. B. The Sierpinski Gasket