# Scope & Sequence

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| Course Name: Applied Mathematics for Technical Professionals **PEIMS Code:** 12701410 | | | **Course Credit:** 1.0  **Course Requirements:** This course is recommended for students in Grades 11-12.  **Prerequisites:** None.  **Recommended Prerequisites:** Algebra I and Geometry. |
| **Course Description:** The process standards describe ways in which students are expected to engage in the content. The placement of the process standards at the beginning of the knowledge and skills listed for each grade and course is intentional. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Students will select appropriate tools such as real objects, manipulatives, paper and pencil, and technology and techniques such as mental math, estimation, and number sense to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, and language. Students will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. | | | |
| **NOTE:** This is a suggested scope and sequence for the course content. This content will work with any textbook or instructional materials. If locally adapted, make sure all TEKS are covered. | | | |
| **Total Number of Periods**  **Total Number of Minutes**  **Total Number of Hours** | 175 Periods  7,875 Minutes  131.25 Hours\* | \*Schedule calculations based on 175/180 calendar days. For 0.5 credit courses, schedule is calculated out of 88/90 days. Scope and sequence allows additional time for guest speakers, student presentations, field trips, remediation, extended learning activities, etc. | |
| **Unit Number, Title, and Brief Description** | **# of Class Periods\***  (assumes 45-minute periods)  Total minutes per unit | **TEKS Covered**  **127.13 Knowledge and skills** | |
| **Unit 1: Mathematical Reasoning and Critical Thinking**  Students will apply critical thinking and problem solving skills in workplace situations by analyzing data to make logical decisions. Students will demonstrate the concepts of gathering information, analysis of a situation, and eliciting feedback from others to generate optimal solutions to a problem. Students will be able to communicate ideas verbally and through multiple representations including manipulatives, graphs, presentations, tables, diagrams, etc. | 25 Periods  1,125 Minutes | 1. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:  (A) apply mathematics to problems arising in everyday life, society, and the workplace;  (B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;  (C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;  (D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;  (E) create and use representations to organize, record, and communicate mathematical ideas;  (F) analyze mathematical relationships to connect and communicate mathematical ideas; and  (G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication | |
| **Unit 2: Financial Math**  Students will apply math concepts to common financial management utilized in business and industry. Students will investigate the relevance of math concepts to business and industry including income, taxes, profit, loss, material, labor, taxes, estimation, and overhead. Students will be able to make sound financial decisions dealing with personal or business financial management issues. | 25 Periods  1,125 Minutes | 5. The student uses mathematical processes with graphical and numerical techniques to study patterns and analyze data related to finance. The student is expected to:  (A) use rates and linear functions to solve problems involving finance and budgeting, including compensations and deductions;  (B) solve problems related to local, state, and federal taxes;  (C) analyze data to make decisions about banking and finance;  (D) use mathematical processes with algebraic formulas, numerical techniques, and graphs to solve problems related to job cost analysis;  (E) identify what parameters to change such as cost of materials, cost of labor, and work time required to improve the overall cost of a project; and  (F) identify the most reasonable mathematical solution using estimation | |
| **Unit 3: Units of Measure**  After completing this unit the student will be able to interpret, evaluate, and understand how different increments are used on several measuring devices. Students will focus on understanding, interpreting, analyzing and knowing how to correctly use units of measure. Students will be able to convert between different units of measure. | 25 Periods  1,125 Minutes | 2. The student applies measurement to all aspects of business and industry occupations. The student is expected to:  (A) use dimensional analysis to select an appropriate tool to make measurements;  (B) apply accurate readings of both U.S. customary and metric measuring devices to a problem situation;  (C) square, measure, and cut materials to specified dimensions;  (D) draw segments to scale using an accurate scale and measure segments that are drawn to scales;  (E) convert temperature values between Celsius and Fahrenheit in situations involving thermodynamics; and  (F) determine length, distance, area, surface area, volume, and weight with appropriate unit labels | |
| **Unit 4: Technical Algebra**  Students will understand how algebraic concepts apply in business and industry situations. Students will distinguish between situations that can be modeled with linear functions and non-linear functions. Students will learn how to use algebraic equations to calculate interest, profit and loss, and other business and industry concepts like rise and run for stair stringers or roof pitch. | 25 Periods  1,125 Minutes | 2. The student uses mathematical concepts of algebra to explain linear and non-linear applications in business and industry situations. The student is expected to:  (A) calculate rise and run such as the rise and run of stair stringers or roof pitch;  (B) distinguish the purpose and difference of a linear and non-linear increase and decrease of a variable with time such as cost or profit;  (C) write systems of equations and inequalities from real-life situations that compare "best deal opportunities" with profit and expenses in businesses;  (D) use linear programing to maximize or minimize linear objective function in real-life situations and determine the reasonableness of solutions;  (E) express numbers as powers of 10 as applied to business and industry settings;  (F) determine the powers and roots of numbers;  (G) apply compound interest formulas related to operating a business; and  (H) use exponential decay models to determine the depreciation on equipment used in business and industry and explain the meaning of models | |
| **Unit 5: Technical Geometry**  Students will apply geometry in reference to degree measurements of angles and perimeter for common geometric shapes like triangles, circles, rectangles, and polygons. Students will apply geometry formulas and functions to solve real-world problems in technical situations. | 25 Periods  1,125 Minutes | 3. The student applies geometric concepts to real-world problems in technical situations. The student is expected to:  (A) identify various geometric figures in order to identify what formulas are needed to solve situational problems;  (C) use trigonometric functions such as sine, cosine, tangent, cotangent, cosecant, and secant to calculate angles and length of sides;  (D) apply Heron's formula for finding areas of triangles when the height is not known;  (E) determine how changing dimensions will affect the perimeter, area, surface area, or volume in a project;  (F) determine how angles will affect structural strength and stability;  (G) apply right triangle relationships using the Pythagorean Theorem, special right triangles, and trigonometry for roof construction, building the frame of a car, or calculating machined parts;  (H) determine the materials needed for a job or project by finding missing parts of a circle | |
| **Unit 6: Graphical, Numerical, and Analytical Representation of Quantitative Data**  Students will collect, organize, interpret and analyze data. Students will present data through technical reports and by visual models including tables, graphs, scatterplots, etc. | 20 Periods  900 Minutes | 6. The student applies mathematical processes to design a study and use graphical, numerical, and analytical techniques to communicate the results. The student is expected to:  (A) interpret and present situations in terms of given graphs and that fit graphics;  (C) collect and organize data; make and interpret scatterplots; and model, predict, and make decisions and critical judgments; and  (D) prepare technical reports and presentations with visual media or models, including tables, graphs, and verbal descriptions | |
| **Unit 7: Application of Math Concepts with Electrical Circuits**  Students will apply mathematical concepts to electrical circuits. Students will have a general knowledge of electrical wiring and how to calculate volts, amps, watts and ohms using Ohm’s and Kirchhoff’s laws. | 5 Periods  225 Minutes | 6. The student applies mathematical processes to design a study and use graphical, numerical, and analytical techniques to communicate the results. The student is expected to:  (B) apply Ohm's Law and Kirchhoff's laws to troubleshoot electrical circuits | |
| **Unit 8: Application of Math Concepts in Engineering**  Students will apply mathematical concepts to create and interpret engineering drawings. Students will be able to identify the components of an engineering drawing including symbols and line types. Students will compute measurements given on an engineering drawing. | 25 Periods  1,125 Minutes | 3. The student applies geometric concepts to real-world problems in technical situations. The student is expected to:  (B) compute measurements such as area, surface area, volume, perimeter, and circumference in order to prepare engineering drawings for projects;  (I) draw orthographic and isometric views and use them to produce engineering drawings;  (J) use cross-sections, including conic sections, of three-dimensional figures to relate to plane figures in specific detail on an engineered drawing; and  (K) explain and use auxiliary views, revolutions, intersections, and engineered drawings  7. The student applies mathematical principles of manufacturing processes. The student is expected to:  (A) identify the line types used on engineering drawings;  (B) identify selected symbols commonly used on engineering drawings;  (C) identify the components of engineering drawings;  (D) read, interpret, and create engineering drawings; and  (E) use proper nomenclature when identifying engineering or manufacturing processes | |