Digital Electronics
At-A-Glance - Lamar CISD

	Professional Standards/Employability Skills/Technical Skills
Ongoing Skills Imbedded All Year	**Professional Standards/Employability Skills** DE 1(A) The student will demonstrate knowledge of how to dress appropriately, speak politely, and conduct oneself in a manner appropriate for the profession. DE 1(B) The student will show the ability to cooperate, contribute, and collaborate as a member of a group in an effort to achieve a positive collective outcome. DE 1(C) The student will present written and oral communication in a clear, concise, and effective manner, including explaining and justifying actions. DE 1(D) The student will demonstrate time-management skills in prioritizing tasks, following schedules, and performing goal-relevant activities in a way that produces efficient results. DE 1(E) The student will demonstrate punctuality, dependability, reliability, and responsibility in performing assigned tasks as directed. **Team Project Roles** DE 4(A) The student will explain the importance of teamwork in the field of electronics. DE 4(B) The student will apply principles of effective problem solving in teams to practice collaboration and conflict resolution. DE 4(C) The student will demonstrate proper attitudes as a team leader and team member. **Mathematical Processes** DE 2(A) The student will apply mathematics to problems arising in everyday life, society, and the workplace. DE 2(B) The student will use a problem-solving model that incorporates analyze 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. DE 2(C) The student will 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. DE 2(D) The student will communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate. DE 2(E) The student will create and use representations to organize, record, and communicate mathematical ideas. DE 2(F) The student will analyze mathematical relationships to connect and communicate mathematical ideas. DE 2(G) The student will display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication. **Scientific Notations** DE 7(A) The student will use scientific notation, engineering notation, and Systems International (SI) notation to conveniently write very large or very small numbers frequently encountered when working with electronics. DE 7(B) The student will describe the process of soldering and how it is used in the assembly of electronic components. **Technical Career Skills** DE 3(A) The student will distinguish the differences between an engineering technician, engineering technologist, and engineer. DE 3(B) The student will identify employment and career opportunities. DE 3(C) The student will identify industry certifications. DE 3(D) The student will discuss ethical issues related to engineering and technology and incorporate proper ethics in submitted projects. DE 3(E) The student will identify and demonstrate respect for diversity in the workplace. DE 3(F) The student will identify and demonstrate appropriate actions and identify consequences relating to discrimination, harassment, and inequality. DE 3(G) The student will explore electronics engineering careers and preparation programs. DE 3(H) The student will explore career preparation learning experiences, including job shadowing, mentoring, and apprenticeship training. DE 3(I) The student will discuss Accreditation Board for Engineering and Technology (ABET) accreditation and implications. **Project Management Skills** DE 5(A) The student will implement project management methodologies, including initiating, planning, executing, monitoring and controlling, and closing a project. DE 5(B) The student will develop a project schedule and complete work according to established criteria. DE 5(C) The student will participate in the organization and operation of a real or simulated engineering project. DE 5(D) The student will develop a plan for production of an individual product. **Work Habits** DE 6(A) The student will master relevant safety tests. DE 6(B) The student will comply with safety guidelines as described in various manuals, instructions, and regulations. DE 6(C) The student will identify governmental and organizational regulations for health and safety in the workplace related to electronics. DE 6(D) The student will identify and classify hazardous materials and wastes according to Occupational Safety and Health Administration (OSHA) regulations. DE 6(E) The student will dispose of hazardous materials and wastes appropriately. DE 6(F) The student will perform maintenance on selected tools, equipment, and machines. DE 6(G) The student will handle and store tools and materials correctly. DE 6(H) The student will describe the results of improper maintenance of material, tools, and equipment.
Ongoing Ways to Show	The student will document every project/problem in engineering notebook. All components or elements of the engineering project must be included to earn maximum points. The student will participate in two or three excursions to DE industries to interact with professionals, learn the skills needed to excel in the profession, and understand available options.

Grading Period	Unit Name	Estimated Time Frame	TEKS
Grading Period 1 29 Days	**Professional Standards/Employability Skills**	**1 Day**	1A, 1B, 1C, 1D, 1E
	DE 1(A) The student will demonstrate knowledge of how to dress appropriately, speak politely, and conduct oneself in a manner appropriate for the profession. DE 1(B) The student will show the ability to cooperate, contribute, and collaborate as a member of a group in an effort to achieve a positive collective outcome. DE 1(C) The student will present written and oral communication in a clear, concise, and effective manner, including explaining and justifying actions. DE 1(D) The student will demonstrate time-management skills in prioritizing tasks, following schedules, and performing goal-relevant activities in a way that produces efficient results. DE 1(E) The student will demonstrate punctuality, dependability, reliability, and responsibility in performing assigned tasks as directed.		
	Team Project Roles	**1 Day**	4A, 4B, 4C
	DE 4(A) The student will explain the importance of teamwork in the field of electronics. DE 4(B) The student will apply principles of effective problem solving in teams to practice collaboration and conflict resolution. DE 4(C) The student will demonstrate proper attitudes as a team leader and team member.		
	Mathematical Processes	**4 Days**	2A, 2B, 2C, 2D, 2E,2F, 2G
	DE 2(A) The student will apply mathematics to problems arising in everyday life, society, and the workplace. DE 2(B) The student will use a problem-solving model that incorporates analyze 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. DE 2(C) The student will 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. DE 2(D) The student will communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate. DE 2(E) The student will create and use representations to organize, record, and communicate mathematical ideas. DE 2(F) The student will analyze mathematical relationships to connect and communicate mathematical ideas. DE 2(G) The student will display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.		
	Scientific Notations	**1 Day**	7A, 7B
	DE 7(A) The student will use scientific notation, engineering notation, and Systems International (SI) notation to conveniently write very large or very small numbers frequently encountered when working with electronics. DE 7(B) The student will describe the process of soldering and how it is used in the assembly of electronic components.		
	Technical Career Skills	**4 Days**	3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H, 3I
	DE 3(A) The student will distinguish the differences between an engineering technician, engineering technologist, and engineer. DE 3(B) The student will identify employment and career opportunities. DE 3(C) The student will identify industry certifications. DE 3(D) The student will discuss ethical issues related to engineering and technology and incorporate proper ethics in submitted projects. DE 3(E) The student will identify and demonstrate respect for diversity in the workplace. DE 3(F) The student will identify and demonstrate appropriate actions and identify consequences relating to discrimination, harassment, and inequality. DE 3(G) The student will explore electronics engineering careers and preparation programs. DE 3(H) The student will explore career preparation learning experiences, including job shadowing, mentoring, and apprenticeship training. DE 3(I) The student will discuss Accreditation Board for Engineering and Technology (ABET) accreditation and implications.		

	Project Management Skills	**1 Day**	5A, 5B, 5C, 5D
	DE 5(A) The student will implement project management methodologies, including initiating, planning, executing, monitoring and controlling, and closing a project. DE 5(B) The student will develop a project schedule and complete work according to established criteria. DE 5(C) The student will participate in the organization and operation of a real or simulated engineering project. DE 5(D) The student will develop a plan for production of an individual product.		
	Work Habits	**1 Day**	6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H
	DE 6(A) The student will master relevant safety tests. DE 6(B) The student will comply with safety guidelines as described in various manuals, instructions, and regulations. DE 6(C) The student will identify governmental and organizational regulations for health and safety in the workplace related to electronics. DE 6(D) The student will identify and classify hazardous materials and wastes according to Occupational Safety and Health Administration (OSHA) regulations. DE 6(E) The student will dispose of hazardous materials and wastes appropriately. DE 6(F) The student will perform maintenance on selected tools, equipment, and machines. DE 6(G) The student will handle and store tools and materials correctly. DE 6(H) The student will describe the results of improper maintenance of material, tools, and equipment.		
	Signals	**12 Days**	7C, 7D, 7E, 7F, 7G, 7H
	DE 7(C) The student will explain the different waveforms and distinctive characteristics of analog and digital signals. DE 7(D) The student will identify the voltage levels of analog and digital signals. DE 7(E) The student will determine whether a material is a conductor, an insulator, or a semiconductor based on its atomic structure. DE 7(F) The student will analyze the three fundamental concepts of voltage, current, and resistance. DE 7(G) The student will define circuit design software and explain its purpose. DE 7(H) The student will identify the fundamental building block of sequential logic.		
	Circuits	**4 Days**	7I, 7J, 7K
	DE 7(I) The student will identify the components of a manufacturer's datasheet, including a logic gate's general description, connection diagram, and function table. DE 7(J) The student will categorize integrated circuits by their underlying circuitry, scale of integration, and packaging style. DE 7(K) The student will describe the advantages and disadvantages of the various sub-families of transistor-transistor logic (TTL) gates.		
Grading Period 2 **26 Days**	**Logic**	**5 Days**	7L, 7M, 7N, 7O
	DE 7(L) The student will explain that a logic gate is depicted by its schematic symbol, logic expression, and truth table. DE 7(M) The student will evaluate the different functions of input and output values of combinational and sequential logic. DE 7(N) The student will explain combinational logic designs implemented with AND gates, OR gates, and INVERTER gates. DE 7(O) The student will identify the fundamental building block of sequential logic.		
	AND-OR-Invert (AOI) Logic	**16 Days**	8A, 8B, 8C, 8D, 8E, 8F
	DE 8(A) The student will develop an understanding of the binary number system and its relationship to the decimal number system as an essential component in the combinational logic design process. DE 8(B) The student will translate a set of design specifications into a truth table to describe the behavior of a combinational logic design by listing all possible input combinations and the desired output for each. DE 8(C) The student will derive logic expressions from a given truth table. DE 8(D) The student will demonstrate logic expressions in sum-of-products (SOP) form and products-of-sum (POS) form. DE 8(E) The student will explain how all logic expressions, whether simplified or not, can be implemented using AND gates and INVERTER gates or OR gates and INVERTER gates. DE 8(F) The student will apply a formal design process to translate a set of design specifications into a functional combinational logic circuit.		

Digital Electronics
Lab Safety and Scientific Processes
Readiness Standards
Supporting Standards

	NAND and NOR Logic	**5 Days**	9A, 9B, 9C
	DE 9(A) The student will apply the Karnaugh Mapping graphical technique to simplify logic expressions containing two, three, and four variables. DE 9(B) The student will define a "don't care" condition and explain its significance. DE 9(C) The student will explain why NAND and NOR gates are considered universal gates.		
Grading Period 3 **25 Days**	**Name of Unit: NAND and NOR Logic** **cont'd**	**25 Days**	9A, 9B, 9C
	DE 9(A) The student will apply the Karnaugh Mapping graphical technique to simplify logic expressions containing two, three, and four variables. DE 9(B) The student will define a "don't care" condition and explain its significance. DE 9(C) The student will explain why NAND and NOR gates are considered universal gates.		
Grading Period 4 **32 Days**	**Flip-Flop**	**8 Days**	11A, 11B, 11C
	DE 9(A) The student will apply the Karnaugh Mapping graphical technique to simplify logic expressions containing two, three, and four variables. DE 9(B) The student will define a "don't care" condition and explain its significance. DE 9(C) The student will explain why NAND and NOR gates are considered universal gates.		
	Asynchronous Counters	**15 Days**	11D, 11E
	DE 11(D) The student will explain how asynchronous counters are characterized and how they can be implemented. DE 11(E) The student will explore the use of the asynchronous counter method to implement up counters, down counters, and modulus counters.		
	Synchronous Counter	**9 Days**	11F, 11G
	DE 11(F) The student will explain how synchronous counters are characterized and how they can be implemented. DE 11(G) The student will explore the use of the synchronous counter method to implement up counters, down counters, and modulus counters.		
Grading Period 5 **32 Days**	**Intro to State Machine Design**	**32 Days**	11H, 11I, 11J
	DE 11(H) The student will describe a state machine. DE 11(I) The student will identify common everyday devices that machines are used to control such as elevator doors, traffic lights, and combinational or electronic locks. DE 11(J) The student will discuss various ways state machines can be implemented.		
Grading Period 6 **29 Days**	**Microcontrollers**	**29 Days**	12A, 12B, 12C, 12D, 12E, 12F, 12G
	DE 12(A) The student will demonstrate an understanding of the use of flowcharts as graphical organizers by technicians, computer programmers, engineers, and other professionals and the benefits of various flowcharting techniques. DE 12(B) The student will develop an understanding of basic programming skills, including variable declaration, loops, and debugging. DE 12(C) The student will identify everyday products that use microcontrollers such as robots, garage door openers, traffic lights, and home thermostats. DE 12(D) The student will describe a servo motor. DE 12(E) The student will explore the way microcontrollers sense and respond to outside stimuli. DE 12(F) The student will explain why digital devices are only relevant if they can interact with the real world. DE 12(G) The student will explain the importance of digital control devices, including microcontrollers in controlling mechanical systems. DE 12(H) The student will demonstrate an understanding that realistic problem solving with a control system requires the ability to interface analog inputs and outputs with a digital device.		