Engineering Design & Problem Solving
At-A-Glance - Lamar CISD

Ongoing Skills Imbedded All Year	Professional Standards/Employability Skills/Technical Skills		
	EDPS 1(B) The student will show the ability to cooperate, contribute, and collaborate as a member of a group to achieve a positive collective outcome. EDPS 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.		
Grading Period	**Unit Name**	**Estimated Time Frame**	**TEKS**
Grading Period 1 29 Days	**Professional Standards/Employability Skills**	**6 Days**	1A, 1B, 1C, 1D, 1E
	EDPS 1(A) The student will demonstrate knowledge of how to dress appropriately, speak politely, and conduct oneself in a manner appropriate for the profession. EDPS 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. EDPS 1(C) The student will present written and oral communication in a clear, concise, and effective manner. EDPS 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. EDPS 1(E) The student will demonstrate punctuality, dependability, reliability, and responsibility in performing assigned tasks as directed.		
	Safe & Proper Work Habits	**8 Days**	2C
	EDPS 2(C) The student will use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.		
	Team Work	**5 Days**	1B, 4B, 4C
	EDPS 1(B) The student will show the ability to cooperate, contribute, and collaborate as a member of a group to achieve a positive collective outcome. EDPS 4(B) The student will communicate explanations and solutions individually and collaboratively in a variety of settings and formats. EDPS 4(C) The student will engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.		
	Engineering Design Methodologies	**10 Days**	5A, 5B, 5C, 6A, 6B
	EDPS 5(A) The student will analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing so as to encourage critical thinking by the student. EDPS 5(B) The student will relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists and engineers as related to the content. EDPS 5(C) The student will research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a STEM field. EDPS 6(A) The student will communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials. EDPS 6(B) The student will draw inferences based on data related to promotional materials for products and services.		
Grading Period 2 26 Days	**Team Projects**	**10 Days**	3A, 3B, 3C, 3D
	EDPS 3(A) The student will identify advantages and limitations of models such as their size, scale, properties, and materials. EDPS 3(B) The student will analyze data by identifying significant statistical features, patterns, sources of error, and limitations. EDPS 3(C) The student will use mathematical calculations to assess quantitative relationships in data. EDPS 3(D) The student will evaluate experimental and engineering designs.		
	Design Process & Techniques	**16 Days**	2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H
	EDPS 2(A) The student will ask questions and define problems based on observations or information from text, phenomena, models, or investigations. EDPS 2(B) The student will apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems. EDPS 2(C) The student will use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards. EDPS 2(D) The student will use appropriate tools such as dial caliper, micrometer, protractor, compass, scale rulers, multimeter, and circuit components.		

	EDPS 2(E) The student will collect quantitative data using the International System of Units (SI) and United States customary units and qualitative data as evidence. EDPS 2(F) The student will organize quantitative and qualitative data using spreadsheets, engineering notebooks, graphs, and charts. EDPS 2(G) The student will develop and use models to represent phenomena, systems, processes, or solutions to engineering problems. EDPS 2(H) The student will distinguish between scientific hypotheses, theories, and laws.		
Grading Period 3 25 Days	**Managing a Project**	**10 Days**	7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H
	EDPS 7(A) The student will select appropriate mathematical models to develop solutions to engineering design problems. EDPS 7(B) The student will integrate advanced mathematics and science skills as necessary to develop solutions to engineering design problems. EDPS 7(C) The student will judge the reasonableness of mathematical models and solutions. EDPS 7(D) The student will investigate and apply relevant chemical, mechanical, biological, electrical, and physical properties of materials to engineering design problems. EDPS 7(E) The student will identify the inputs, processes, outputs, control, and feedback associated with open and closed systems. EDPS 7(F) The student will describe the difference between open-loop and closed-loop control systems. EDPS 7(G) The student will evaluate different measurement tools such as dial caliper, micrometer, protractor, compass, scale rulers, and multimeter, make measurements with accuracy and precision, and specify tolerances. EDPS 7(H) The student will use conversions between measurement systems to solve real-world problems.		
	Concepts of Engineering	**15 Days**	9A, 9B, 9C, 9D, 9E, 9F
	EDPS 9(A) The student will identify and describe career options, working conditions, earnings, and educational requirements of various engineering disciplines such as those listed by the Texas Board of Professional Engineers. EDPS 9(B) The student will recognize that engineers are guided by established codes emphasizing high ethical standards. EDPS 9(C) The student will explore the differences, similarities, and interactions between engineers, scientists, and mathematicians. EDPS 9(D) The student will describe how technology has evolved in the field of engineering and consider how it will continue to be a useful tool in solving engineering problems. EDPS 9(E) The student will discuss the history and importance of engineering innovation on the U.S. economy and quality of life. EDPS 9(F) The student will describe the importance of patents and the protection of intellectual property rights.		
Grading Period 4 32 Days	**Virtual Design – CAD**	**32 Days**	8A, 8B, 8C, 8D, 8E, 8F
	EDPS 8(A) The student will communicate visually by sketching and creating technical drawings using established engineering graphic tools, techniques, and standards. EDPS 8(B) The student will read and comprehend technical documents, including specifications and procedures. EDPS 8(C) The student will prepare written documents such as memorandums, emails, design proposals, procedural directions, letters, and technical reports using the formatting and terminology conventions of technical documentation. EDPS 8(D) The student will organize information for visual display and analysis using appropriate formats for various audiences, including technical drawings, graphs, and tables such as file conversion and appropriate file types, in order to collaborate with a wider audience. EDPS 8(E) The student will evaluate the quality and relevance of sources and cite appropriately. EDPS 8(F) The student will defend a design solution in a presentation.		
Grading Period 5 32 Days	**Build Prototype**	**32 Days**	10A, 10B, 10C, 10D, 10E, 10F, 10G, 10H, 10I
	EDPS 10(A) The student will identify and define an engineering problem. EDPS 10(B) The student will formulate goals, objectives, and requirements to solve an engineering problem. EDPS 10(C) The student will determine the design parameters associated with an engineering problem such as materials, personnel, resources, funding, manufacturability, feasibility, and time. EDPS 10(D) The student will establish and evaluate constraints pertaining to a problem, including health, safety, social, environmental, ethical, political, regulatory, and legal. EDPS 10(E) The student will identify or create alternative solutions to a problem using a variety of techniques such as brainstorming, reverse engineering, and researching engineered and natural solutions. EDPS 10(F) The student will test and evaluate proposed solutions using methods such as creating models, prototypes, mock-ups, or simulations or performing critical design review, statistical analysis, or experiments. EDPS 10(G) The student will apply structured techniques to select and justify a preferred solution to a problem such as a decision tree, design matrix, or cost-benefit analysis. EDPS 10(H) The student will predict performance, failure modes, and reliability of a design solution. EDPS 10(I) The student will prepare a project report that clearly documents the designs, decisions, and activities during each phase of the engineering design process.		

<table>
<tr><td rowspan="4">Grading Period 6
29 Days</td><td>Build Prototype</td><td>13 Days</td><td>10A, 10B, 10C, 10D, 10E, 10F, 10G, 10H, 10I</td></tr>
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<tr><td>Work Place Skills</td><td>16 Days</td><td>11A, 11B, 11C, 11D, 11E, 11F, 11G, 11H, 11I</td></tr>
<tr><td colspan="3">EDPS 11(A) The student will participate in the design and implementation of a real-world or simulated engineering project using project management methodologies, including initiating, planning, executing, monitoring and controlling, and closing a project.
EDPS 11(B) The student will develop a plan and project schedule for completion of a project.
EDPS 11(C) The student will work in teams and share responsibilities, acknowledging, encouraging, and valuing contributions of all team members.
EDPS 11(D) The student will compare and contrast the roles of a team leader and other team member responsibilities.
EDPS 11(E) The student will identify and manage the resources needed to complete a project.
EDPS 11(F) The student will use a budget to determine effective strategies to meet cost constraints.
EDPS 11(G) The student will create a risk assessment for an engineering design project.
EDPS 11(H) The student will analyze and critique the results of an engineering design project.
EDPS 11(I) The student will maintain an engineering notebook that chronicles work such as ideas, concepts, inventions, sketches, and experiments.</td></tr>
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