

Syllabus:Engineering Pathway

Jason Quintanilla Phone#: 361-584-2547

Pathway Description

Students will adopt a problem-solving mindset and explore a breadth of engineering career opportunities. We offer four courses at Bishop High School: **Principles of Applied Engineering, Engineering Design Process, Digital Electronics, and Engineering Science.** This school uses the **Project Lead The Way** curriculum, which is aligned to courses as specified by the TEA, along with other supplemental materials, and is intended to build knowledge and skills in engineering, as well as empower students to develop essential skills such as problem solving, critical and creative thinking, communication, collaboration, and perseverance. This pathway has an **Industry-Based Certification**, administered at the end of **Engineering Science: NOCTI Foundations of Engineering Technology**.

Materials



Engineering Notebook: This is a composition notebook or binder, **that the teacher will provide.** Appropriate notebooks are permanently bound, and feature quad-ruled or dot-ruled paper, preferably with $\frac{1}{4}$ in divisions. **Kept in Classroom most of the time.**

School-Issued Laptop: This class is in a computer lab, but many students prefer to use their laptops, and find it helpful to take photographs of projects in progress with the cameras on their laptops.

Online Textbook: This school uses MyPLTW, which can be signed into via Classlink. Supplementary materials may be provided in paper or via Google Classroom.

Pencils, Pens, Paper, Highlighters, Tape, Glue, Other Organizational Aids: The teacher will generally provide some basic supplies for students to use freely, but many students will prefer their own.

Occasionally, students may be asked to bring some supplies for a project from home, such as a small toy they will take apart and won't mind getting broken in the process, or some newspaper or cardboard.

Absences and Makeup Work

If a student is absent from class, **THEY** are responsible for getting and making up any missing work.

- Occasionally, students may be absent during group projects. Due to the nature of getting into a project late or having to miss parts of it, students will be expected to keep documentation and share it with partners. They will not be penalized, and will be given time to complete their portions. Those students that entirely miss a project will be may be assessed differently, or be given an alternate assignment which can be completed on their own to demonstrate growth or proficiency.
- Extensions will be provided equal to the days that were missed.

Students are expected to turn assignments in on time and completed themselves. Any late work will not receive full credit.

- 1 day late: -15 pts
- 2 days late: -30 pts

Extensions may be given to students who contact BEFORE an assignment is due to request one, with a reasonable request.

Additional Policies	
No personal communications devices, as per district policy. Students may provide wired headphones/earbuds provided they are not being used as a wireless communications device, and are using it for educational purposes, such as watching lectures or videos related to classwork. Other computer accessories may be allowed on a case-by-case basis, as long as it cannot be used as a personal communications device. As there is the occasional use of tools in this course, students will be expected to conduct themselves safely. Students will always receive instruction on safe tool usage before using them. Digital Electronics students are expected to take a lesson on electronics safety and pass an assessment.	District grading policy for general ed classes will be followed: Daily Assignments: 40% Quizzes: 20% Tests: 40% Many assignments in engineering are project or activity-based, and so sometimes a grade will be dependent on prior assignments having been completed. Sometimes, a student's body of work in a unit or their daily documentation will be taken as a grade as a growth measurement. If a student has taken alternate forms of documentation, or their documentation lies with another student and an error has been made, it is helpful to tell the teacher for a timely, accurate measure of growth. Students are encouraged to speak with the teacher when concerned about grades so that improvements can be made.

Class Expectations & Discipline Policy

Students are expected to behave in class and online in a safe and respectful manner. In addition to being respectful of others, students should be on time, on task, and prepared to learn every day. Students that have shown themselves to be conducting themselves unsafely will not be allowed to participate in activities where this may endanger themselves or others.

Consequences may include, but are not limited to, within the scope of the district discipline policy:

- Verbal Warnings
- Teacher Detention/Cleanup Duty
- Parent Contacts/Conferences
- Administrative Referrals



Academic Integrity, AI, and Plagiarism

Work is expected to be an original record of a student's effort, progress, and growth. Plagiarism and uncritically copying answers given by an AI or search engine and presenting it as one's own work without properly referencing one's sources will not be tolerated. Students will be allowed to correct a lack of citation, when it is made honestly and it is clear that the student has done original work. Plagiarized assignments passed off as original work will receive a zero, a student will be given a referral, and parents will be contacted.

In addition, many students may take in the wrong lessons by relying on search engines or artificial intelligence as the sole endpoint of their effort. Many vocabulary terms we use in this course may have alternate meanings in other fields, or may be contextually dependent, as an example.

When AI, search engines, encyclopedias, and other people's work are used to facilitate your own original solutions, it is important to cite sources, and to use it as a STARTING point, not the end result. If students should collaborate or reference material, they should openly acknowledge this and provide the source. More information on citations will be provided in lessons to students.

TEKS Alignment for pathway courses

Principles of Applied Engineering(PLTW Engineering Essentials)	Engineering Design Process(PLTW Introduction to Engineering Design)
1. Engineering and Technology Systems:The student investigates the components of engineering and technology systems. 2. Engineering Communication: The student presents conclusions, research findings, and designs a variety of media throughout the course. 3. Engineering Safety: The student uses appropriate tools and demonstrates safe work habits. 4. Technology, Its Changes and Impacts: The student describes the factors that affect the progression of technology and analyzes the potential intended and unintended consequences of technological advances. 5. Engineering Design: The student thinks critically and applies fundamental principles of system modeling and design to multiple design projects. 6. Careers in Robotics and Automation: The student understands the opportunities and careers in fields related to robotics, process control, and automation systems. 7. Careers in Electrical and Mechanical Systems: The student understands the opportunities and careers in fields related to electrical and mechanical systems 8. Collaboration: The student collaborates as a team member while completing a comprehensive project. 9. Drafting and Engineering Drawing: The student demonstrates a knowledge of drafting by completing a series of drawings that can be published by various media. 10. Engineering Design Process: The student creates justifiable solutions to open-ended real-world problems using engineering design practices and processes.	1. Ethics in Engineering: The student discusses ethics pertaining to engineering. The student is expected to identify and discuss the importance of professionalism, standards of conduct, and ethics as defined by the Texas Engineering Practice Act and rules concerning the practice of engineering and surveying. 2. Engineering Design Process: The student understands there are different stages of the engineering design process and the importance of working through each stage as part of an iterative process. 3. Project Management and Problem-Solving: The student explores and develops skills to solve problems, make decisions, and manage a project. 4. Occupational Safety and Health: The student understands the foundations of occupational safety and health. 5. Engineering Documentation: The student understands the value of maintaining documentation using an engineering notebook 6. Research in the Engineering Design Process: The student understands how to conduct research in the engineering design process. 7. The Problem Statement: The student understands the process of creating and refining a problem statement in the engineering design process 8. Generating Solutions: The student understands the importance of conceptualizing a solution in the engineering design process. 9. Technical Drawing: The student creates technical drawings in the engineering design process. 10. Prototyping: The student creates prototypes in the engineering design process 11. Evaluating Solutions: The student tests and evaluates a prototype or solution using experiments, data, and end-user feedback 12. Iteration: The student understands the iterative nature of the engineering design process to develop a solution. 13. Communication: The student prepares and delivers a professional presentation detailing the experience of working through each step of the engineering design process to create a viable solution.

TEKS Alignment for pathway courses

Digital Electronics(PLTW Digital Electronics)	Engineering Science(PLTW Principles of Engineering)
1. Engineering Mathematics: The student uses mathematical processes to acquire and demonstrate mathematical understanding. 2. Careers in Engineering: The student demonstrates the skills necessary for success in a technical career. 3. Teamwork and Collaboration: The student participates in team projects in various roles. 4. Project Management: The student develops skills for managing a project. 5. Safety in the Electronics Classroom: The student practices safe and proper work habits 6. Analog and Digital Electronics: The student explores the fundamentals of analog and digital electronics. The student uses appropriate notation and understands the logic of circuit design and logic gates. 7. AOI Logic: The student understands and uses multiple forms of AND-OR-INVERT(AOI) logic. 8. NAND and NOR logic: The student understands, explains, and applies NAND and NOR logic and understands the benefits of using universal gates. 9. Miscellaneous combinational logic systems: The student understands combinational logic systems, including seven-segment displays, Exclusive OR and Exclusive NOR gates, multiplexer/demultiplexer pairs. The student understands the relative value of various logic approaches. 10. Sequential Logic: The student understands and describes multiple types of sequential logic and various uses of sequential logic. 11. Microcontrollers: The student explores microcontrollers, specifically their usefulness in real-world applications.	1. Student Inquiry: The student, for at least 40% of instructional time, ask questions, identifies problems, and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena ,or design solutions using appropriate tools and models 2. Data Analysis: The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. 3. Communication: The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. 4. History of Science and Engineering: The student knows the contributions of science and engineers and recognizes the importance of scientific research and innovation on society. 5. Careers in Science, Engineering, and Engineering Technology: The student investigates engineering-related fields and career opportunities. 6. Design Problems: The student demonstrates an understanding of design problems and works individually and as a member of a team to solve design problems. 7. Principles of Mechanisms: The student understands mechanisms, including simple and compound machines, and performs calculations related to mechanical advantage, drive ratios, work, and power. 8. Energy and Electricity: The student understands energy sources, energy conversion, and circuits and performs calculations related to work and power. 9. Energy Conversion and Management: The student understands system energy requirements and how energy sources can be combined to convert energy into useful forms. The student understands the relationships between material conductivity, resistance, and geometry in order to calculate energy transfer and determine power loss and efficiency. 10. Forces and Statics: The student understands the interaction of forces acting on a body and performs calculations related to structural design. 11. Material Properties: The student understands material properties and the importance of choosing appropriate materials for design. 12. Material Testing: The student uses material testing to determine a product's function and performance. 13. Control Systems: The student understands that control systems are designed to provide cosentient process control and reliability and uses computer software to create flowcharts and control system operating programs. 14. Fluid Power Systems: The student demonstrates an understanding of fluid power systems and calculates values in a variety of systems. 15. Statistics: The student demonstrates an understanding of statistics and applies the concepts to real-world engineering design problems. 16. Kinematics: The student demonstrates and understanding of kinematics in one and two dimensions and applies the concepts to real-world engineering design problems.