Davison Community Schools
ADVISORY CURRICULUM COUNCIL
I/II/III 16JAN15

Principles of Engineering (POE)

Course Essential Questions (from Phase I report):

1. How does the knowledge of simple machines impact the profession of engineering?
2. Why are Ohm's and Kirchhoff's Laws important concepts when dealing with electricity?
3. Why must an engineer know how to calculate forces through a particular design?
4. How has programming logic controls changed society?
5. Why are statics and kinematics important to engineering?

Phase II Curriculum

Unit 1: Energy and Power

Essential Questions:

1. What are some current applications of simple machines, gears, pulleys, and sprockets?
2. What are some strategies that can be used to make everyday mechanisms more efficient?
3. What are the trade-offs of mechanical advantage related to design?
4. Why must efficiency be calculated and understood during the design process?

Essential Understanding:

1. Engineers and engineering technologists apply math, science, and discipline-specific skills to solve problems.
2. Engineering and engineering technology careers offer creative job opportunities for individuals with a wide variety of backgrounds and goals.
3. Technical communication can be accomplished in oral, written, and visual forms and must be organized in a clear and concise manner.
4. Most mechanisms are composed of gears, sprockets, pulley systems, and simple machines.
5. Mechanisms are used to redirect energy within a system by manipulating force, speed, and distance.
6. Mechanical advantage ratios mathematically evaluate input work versus output work of mechanisms.

Curriculum Standards

I – Academic Foundations

A – Demonstrate language arts knowledge and skills required to pursue the full range of post-secondary education and career opportunities.

1 – Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.

2 – Demonstrate use of the concepts, strategies, and systems for obtaining and conveying ideas and information to enhance communication in the workplace.

3 – Locate, organize and reference written information from various sources to communicate with co-workers and clients/participants.

4 – Evaluate and use information resources to accomplish specific occupational tasks.

5 – Use correct grammar, punctuation and terminology to write and edit documents.

6 – Develop and deliver formal and informal presentations using appropriate media to engage and inform audiences.

7 – Interpret verbal and nonverbal cues/behaviors to enhance communication with co-workers and clients/participants.

B – Demonstrate mathematics knowledge and skills required to pursue the full range of postsecondary education and career opportunities.

1 – Identify whole numbers, decimals, and fractions.

2 – Demonstrate knowledge of basic arithmetic operations such as addition, subtraction, multiplication, and division.

3 – Demonstrate use of relational expressions such as equal to, not equal, greater than, less than, etc.

4 – Apply data and measurements to solve a problem.

5 – Analyze Mathematical problem statements for missing and/or irrelevant data.

6 – Construct charts/tables/graphs from functions and data.

7 – Analyze data when interpreting operational documents.

C – Demonstrate science knowledge and skills required to pursue the full range of post-secondary and career education opportunities.
1 – Evaluate scientific constructs including conclusions, conflicting data, controls, data, inferences, limitations, questions, sources of errors, and variables.
2 – Apply scientific methods in qualitative and quantitative analysis, data gathering, direct and indirect observation, predictions, and problem identification.
3 – Explain the relationships between scientific theory, scientific principles and laws, in technology, and engineering.
D – Demonstrate the ability to select, apply, and convert systems of measurement to solve problems.
2 – Apply fundamental laws and principles relevant to engineering and technology.
E – Demonstrate the ability to use Newton's Laws of Motion to analyze static and dynamic systems with and without the presence of external forces.
2 – Use the relationships between energy, work, and power to solve a variety of problems involving mechanical, fluid, electrical, and thermal systems.

II – Communications
A – Develop and interpret tables, charts, and figures to support written and oral communications.
1 – Create tables, charts, and figures to support written and oral communications.
2 – Interpret tables, charts, and figures used to support written and oral communication.
B – Apply active listening skills to obtain and clarify information.
1 – Interpret a given verbal message/information.
2 – Respond with restatement and clarification techniques to clarify information.
3 – Model behaviors that demonstrate active listening.
C – Listen to and speak with diverse individuals to enhance communication skills.
1 – Apply factors and strategies for communicating with a diverse workforce.
2 – Demonstrate ability to communicate and resolve conflicts within a diverse workforce.
D – Apply active listening skills to obtain or clarify information pertaining to plans, processes, projects, or designs.
1 – Interpret messages or information provided that clarifies issues, ideas, plans, projects, or processes.
2 – Respond and/or restate information that will clarify STEM techniques to be used and/or information to be applied to projects, plans, or processes.
E – Prepare STEM material in oral, written, or visual formats that provide information to an intended audience to fulfill specific communication need of an audience.
1 – Use effective methods to communicate concepts of STEM to a broadly represented audience.
2 – Effectively communicate STEM information to a select audience.
3 – Apply the ability to read, interpret, and analyze STEM materials discerning the information and concepts.

III – Problem Solving and Critical Thinking
A – Effectively develop and apply the skills inherent in systems engineering where requirements, configuration, integration, project management, quality assurance, and process applications are necessary.
1 – Employ critical thinking skills independently and in teams to solve problems and make decisions (e.g., analyze, synthesize and evaluate).
B – Use mathematics, science, and technology concepts and processes to solve problems in projects involving design and/or production (e.g. medical, agricultural, biotechnological, energy and power, information and communication, transportation, manufacturing, and construction).
1 – Apply the core concepts of technology and recognize the relationships with STEM systems (e.g. systems, resources, criteria and constraints, optimization and trade-off, and controls).

IV - Information Technology Applications
B – Employ technological tools to expedite workflow.
5 – Access and navigate Internet (e.g., use a web browser).
12 – Deliver presentations with supporting materials.
C – Demonstrate Digital Citizenship
3 – Discuss and demonstrate proper netiquette in online communications
6 – Discuss and adhere to fair use policies and copyright guidelines

VI – Safety, Health, and Environmental
A – Apply safety practices in the environment where science, technology, engineering, and/or mathematical principles are appropriate to ensure a safe workplace.
1 – Assess workplace conditions with regard to safety and health.
2 – Select appropriate personal protective equipment as needed for a safe workplace/jobsite.
4 – Implement safety precautions to maintain a safe worksite.
5 – Use appropriate safety techniques, equipment, and processes in planning and /or project applications.

B – Develop an awareness of safety, health, and environmental hazards inherent in the STEM arenas when solving problems, developing plans, processes, or completing projects to be proactive in promoting safety.
1 – Identify existing or potential hazards to existing or assigned plans, projects, or processes where safety, health, or environment might be in play.

VII – Leadership and Teamwork
A – Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.
1 – Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.
2 – Employ organizational and staff development skills to foster positive working relationships and accomplish organizational goals.
3 – Employ teamwork skills to achieve collective goals and use team members' talents effectively.

IX -Employability and career Development
A – Know and understand the importance of employability skills.
1 – Identify and demonstrate positive work behaviors and personal qualities needed to be employable.
B – Explore, plan, and effectively manage careers.
2 – Identify and explore career opportunities in one or more career pathways to build an understanding of the opportunities available in the cluster.
C – Demonstrate skills related to seeking and applying for employment to find and obtain a desired job.
6 – List the standards and qualifications that must be met in order to enter a given industry.
7 – Employ critical thinking and decision-making skills to exhibit qualifications to a potential employer.
8 – Maintain a career portfolio to document knowledge, skills and experience in a career field.
9 – Demonstrate skills in evaluating and comparing employment opportunities in order to accept employment positions that match career goals.
10 – Identify and exhibit traits for retaining employment to maintain employment once secured.
11 – Engage experiences in STEM where an individual can identify personal interests and expectations for career and personal development.

X – Technical Skills
A – Employ information management techniques and strategies in the workplace to assist in decision-making.
1 – Use information literacy skills when accessing, evaluating and disseminating information.
B – Employ planning and time management skills and tools to enhance results and complete work tasks.
1 – Develop goals and objectives.
2 – Prioritize tasks to be completed.
C – Apply concepts and processes for the application of technology to engineering.
1 – Use knowledge, techniques, skills, and modern tools necessary for engineering practice.
4 – Effectively use project management techniques (e.g. working in teams, appropriate time management practices, effective organizational skills, conduct analysis of cost, resources, and production capacity, and quality practices with continuous improvement).
5 – Use and calibrate probes, sensors, measuring systems, and devices to collect data using traceable standards.
E – Applied Mathematics
1 – Demonstrate knowledge of mathematical operations
2 – Demonstrate knowledge of geometry
3 – Demonstrate knowledge of trigonometry

XI – Engineering Technology Pathway
A – Know the elements of the processes and concepts for understanding the design process.
2 – Explain the elements and steps of the design process and tools or techniques that can be used for each step.
B – Develop processes and concepts to apply the design process.
1 – Apply the design process, including understanding customer needs, interpreting and producing design constraints and criteria, planning and requirements analysis, brainstorming and idea generation, using appropriate modeling and prototyping, testing, verification, and implementation.
3 – Demonstrate the ability to record and organize information and test data during design evaluation.

I Know Students will know about….	**I Can** Students will be able to……

1. Crowbars, wheelbarrows, tweezers, watches, bicycles, clocks, nautilus weight machines, etc. are all examples of current applications of simple machines, gears, pulleys, and sprockets. 2. Regularly servicing mechanical equipment and reducing friction are some strategies that can be used to make everyday mechanisms more efficient. 3. You cannot always get away with using less work; the reduced force that you apply is compensated by the fact that you have to move the force through a greater distance. 4. If a product is inefficient, it is not the best possible solution to the problem. Consumers do now want an inefficient product.	1. Differentiate between engineering and engineering technology. 2. Conduct a professional interview and reflect on it in writing. 3. Identify and differentiate among different engineering disciplines. 4. Measure forces and distances related to mechanisms. 5. Distinguish between the six simple machines, their attributes, and components. 6. Calculate mechanical advantage and drive ratios of mechanisms. 7. Design, create, and test gear, pulley, and sprocket systems. 8. Calculate work and power in mechanical systems. 9. Determine efficiency in a mechanical system. 10. Design, create, test, and evaluate a compound machine design.
Unit 2: Materials and Statics	
Essential Questions: 1. Why is it crucial for designers and engineers to construct accurate free body diagrams of the parts and structures that they design? 2. Why must designers and engineers calculate forces acting on bodies and structures? 3. When solving truss forces, why is it important to know that the structure is statically determinate?	**Essential Understanding:** 1. Laws of motion describe the interaction of forces acting on a body. 2. Structural member properties including centroid location, moment of inertia, and modulus of elasticity are important considerations for structure design. 3. Static equilibrium occurs when the sum of all forces acting on a body are equal to zero. 4. Applied forces are vector quantities with a defined magnitude, direction, and sense, and can be broken into vector components. 5. Forces acting at a distance from an axis or point attempt or cause an object to rotate. 6. In a statically determinate truss, translational and rotational equilibrium equations can be used to calculate external and internal forces. 7. Free body diagrams are used to illustrate and calculate forces acting upon a given body.
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2 – Apply fundamental laws and principles relevant to engineering and technology.

E – Demonstrate the ability to use Newton's Laws of Motion to analyze static and dynamic systems with and without the presence of external forces.

1 – Use the laws of conservation of energy, charge, and momentum, to solve a variety of problems involving mechanical, fluid, chemical, biological, electrical, and thermal systems.

2 – Use the relationships between energy, work, and power to solve a variety of problems involving mechanical, fluid, electrical, and thermal systems.

II – Communications

B – Apply active listening skills to obtain and clarify information.

1 – Interpret a given verbal message/information.

2 – Respond with restatement and clarification techniques to clarify information.

3 – Model behaviors that demonstrate active listening.

C – Listen to and speak with diverse individuals to enhance communication skills.

1 – Apply factors and strategies for communicating with a diverse workforce.

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1 – Employ critical thinking skills independently and in teams to solve problems and make decisions (e.g., analyze, synthesize and evaluate).

B – Use mathematics, science, and technology concepts and processes to solve problems in projects involving design and/or production (e.g. medical, agricultural, biotechnological, energy and power, information and communication, transportation, manufacturing, and construction).

1 – Apply the core concepts of technology and recognize the relationships with STEM systems (e.g. systems, resources, criteria and constraints, optimization and trade-off, and controls).

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B – Employ technological tools to expedite workflow.

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4 – Implement safety precautions to maintain a safe worksite.

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1 – Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.

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4 – Establish and maintain effective working relationships with all levels of personnel and other departments in order to accomplish objectives and tasks.
5 – Conduct and participate in meetings to accomplish work tasks.

IX -Employability and career Development
A – Know and understand the importance of employability skills.
1 – Identify and demonstrate positive work behaviors and personal qualities needed to be employable.
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X – Technical Skills
A – Employ information management techniques and strategies in the workplace to assist in decision-making.
1 – Use information literacy skills when accessing, evaluating and disseminating information.
3 – Maintain records to facilitate ongoing business operations.
B – Employ planning and time management skills and tools to enhance results and complete work tasks.
1 – Develop goals and objectives.
2 – Prioritize tasks to be completed.
C – Apply concepts and processes for the application of technology to engineering.
1 – Use knowledge, techniques, skills, and modern tools necessary for engineering practice.
4 – Effectively use project management techniques (e.g. working in teams, appropriate time management practices, effective organizational skills, conduct analysis of cost, resources, and production capacity, and quality practices with continuous improvement).
5 – Use and calibrate probes, sensors, measuring systems, and devices to collect data using traceable standards.
8 – Use, handle, and store tools and materials correctly, perform preventative maintenance, understanding the results of negligence and improper maintenance or improper calibration.
E – Applied Mathematics
1 – Demonstrate knowledge of mathematical operations
2 – Demonstrate knowledge of geometry
3 – Demonstrate knowledge of trigonometry
F – Identify Measurements
2 – Calculate unit conversion

XI – Engineering Technology Pathway
A – Know the elements of the processes and concepts for understanding the design process.
1 – Explain why and how the contributions of great innovators are important to society.
2 – Explain the elements and steps of the design process and tools or techniques that can be used for each step.
B – Develop processes and concepts to apply the design process.
1 – Apply the design process, including understanding customer needs, interpreting and producing design constraints and criteria, planning and requirements analysis, brainstorming and idea generation, using appropriate modeling and prototyping, testing, verification, and implementation.
2 – Demonstrate the ability to evaluate a design or product and improve the design using testing, modeling, and research.
3 – Demonstrate the ability to record and organize information and test data during design evaluation.

I Know Students will know about….	**I Can** Students will be able to……
1. Drawing accurate free body diagrams can aid in solving for the unknown forces, and make it easier to understand the forces, torques, or moments in relation to one another. 2. Designers and engineers must calculate forces acting on bodies and structures to ensure that designs do not fail. 3. A structure that is statically determinate has static equilibrium equations that are sufficient for determining the internal truss forces and reactions on that structure.	1. Create free body diagrams of objects, identifying all forces acting on the object. 2. Mathematically locate the centroid of structural members. 3. Calculate moment of inertia of structural members. 4. Differentiate between scalar and vector quantities. 5. Identify magnitude, direction, and sense of a vector. 6. Calculate the X and Y components given a vector. 7. Calculate moment forces given a specified axis. 8. Use equations of equilibrium to calculate unknown forces. 9. Use the method of joints strategy to determine forces in the members of a statically determinate

Unit 3: Control Systems

Essential Questions:	**Essential Understanding:**
1. What are the advantages and disadvantages of using programmable logic to control machines versus monitoring and adjusting processes manually? 2. What are some everyday seemingly simple devices that contain microprocessors, and what function do the devices serve? 3. What questions must designers ask when solving problems in order to decide between digital or analog systems and between open or closed loop systems?	1. Flowcharts provide a step by step schematic representation of an algorithm or process. 2. Control systems are designed to provide consistent process control and reliability. 3. Control system protocols are an established set of commands or functions typically created in a computer programming language. 4. Closed loop systems use digital and analog sensor feedback to make operational and process decisions. 5. Open loop systems use programming constants such as time to make operational and process decisions.

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4 – Apply data and measurements to solve a problem.

5 – Analyze Mathematical problem statements for missing and/or irrelevant data.

6 – Construct charts/tables/graphs from functions and data.

7 – Analyze data when interpreting operational documents.

D – Demonstrate the ability to select, apply, and convert systems of measurement to solve problems.

1 – Apply scalar and vector quantities as applied to physical systems, such as the relationship between position, velocity, and acceleration.

2 – Apply fundamental laws and principles relevant to engineering and technology.

E – Demonstrate the ability to use Newton's Laws of Motion to analyze static and dynamic systems with and without the presence of external forces.

1 – Use the laws of conservation of energy, charge, and momentum, to solve a variety of problems involving mechanical, fluid, chemical, biological, electrical, and thermal systems.

2 – Use the relationships between energy, work, and power to solve a variety of problems involving mechanical, fluid, electrical, and thermal systems.

II – Communications

A – Develop and interpret tables, charts, and figures to support written and oral communications.

1 – Create tables, charts, and figures to support written and oral communications.

2 – Interpret tables, charts, and figures used to support written and oral communication.

B – Apply active listening skills to obtain and clarify information.

1 – Interpret a given verbal message/information.

2 – Respond with restatement and clarification techniques to clarify information.

3 – Model behaviors that demonstrate active listening.

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1 – Use effective methods to communicate concepts of STEM to a broadly represented audience.

2 – Effectively communicate STEM information to a select audience.

3 – Apply the ability to read, interpret, and analyze STEM materials discerning the information and concepts.

III – Problem Solving and Critical Thinking

A – Effectively develop and apply the skills inherent in systems engineering where requirements, configuration, integration, project management, quality assurance, and process applications are necessary.

2 – Use the skills required in project management to track and assess the progress of a plan, process, or project as assigned.

3 – Apply the skills in quality assurance as well as those in process management and development for appropriate applications of systems integration techniques to an assigned project.

5 – Identify, write and monitor workplace performance goals to guide progress in assigned areas of responsibility and accountability.

B – Use mathematics, science, and technology concepts and processes to solve problems in projects involving design and/or production (e.g. medical, agricultural, biotechnological, energy and power, information and communication, transportation, manufacturing, and construction).

1 – Apply the core concepts of technology and recognize the relationships with STEM systems (e.g. systems, resources, criteria and constraints, optimization and trade-off, and controls).

IV - Information Technology Applications

D – Evaluate and use skills relating to the differing technological tools used to manipulate, report, or operate with data acquisition.

3 – Apply a currently applicable computer programming language to a process, project, plan, or issue as assigned.

4 – Apply statistical tools that verify the reliability or validity of the data used or collected in the plan, project, process, or problem.

V – Systems

B – Implement quality control systems and practices to ensure quality products and services.

1 – Describe quality control standards and practices common to the workplace.

2 – Diagnose and make necessary corrections or improvements to a technical system in a business, industry, or simulated work place setting.

IX – Employability and Career Development

A – Know and understand the importance of employability skills.

1 – Identify and demonstrate positive work behaviors and personal qualities needed to be employable.

X – Technical Skills

B – Employ planning and time management skills and tools to enhance results and complete work tasks.
1 – Develop goals and objectives.
2 – Prioritize tasks to be completed.
3 – Develop timelines using time management knowledge and skills.
4 – Use project-management skills to improve workflow and minimize costs.
C – Apply concepts and processes for the application of technology to engineering.
7 – Safely operate a variety of tools, machines, and equipment (e.g. milling machines, rapid prototyping machines, drill press, band saw, CNC machines, and hand tools).
L – Dimensioning Skills
3 – Identify finished surfaces

I Know Students will know about….	**I Can** Students will be able to……
1. Advantages would be that it is faster, cheaper, and more efficient. Disadvantages would be computer problems, paying someone to write the code, and if you do not have power, the system does not work. 2. Microprocessors are found in virtually every consumer product that requires electric power, such as microwave ovens, automobiles, video recorders, cell phones, digital cameras, and hand-held computers. 3. When designers are deciding between digital or analog systems and between open or closed loop systems, the function of the system, and whether or not the system needs to respond to feedback must be looked at.	1. Create detailed flow charts that utilize a computer software application. 2. Create control system operating programs that utilize computer software. 3. Create system control programs that utilize flowchart logic. 4. Choose appropriate input and output devices based on the need of a technological system. 5. Differentiate between the characteristics of digital and analog devices. 6. Judge between open and closed loop systems in order to choose the most appropriate system for a given technological problem. 7. Design and create a control system based on given needs and constraints.

Unit 4: Statics and Kinematics

Essential Questions:	**Essential Understanding:**
1. Why is it crucial for designers and engineers to utilize statistics throughout the design process? 2. Why is process control a necessary statistical process for ensuring product success? 3. Why is theory-based data interpretation valuable in decision making? 4. Why is experiment-based data interpretation valuable in decision making?	1. Engineers use statistics to make informed decisions based upon established principles. 2. Visual representations of data analyses allow for easy distribution and understanding of data. 3. Statistics is based upon both theoretical and experimental data analysis.

Curriculum Standards

I – Academic Foundations
B – Demonstrate mathematics knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
1 – Identify whole numbers, decimals, and fractions.
2 – Demonstrate knowledge of basic arithmetic operations such as addition, subtraction, multiplication, and division.
4 – Apply data and measurements to solve a problem.
5 – Analyze Mathematical problem statements for missing and/or irrelevant data.
C – Demonstrate science knowledge and skills required to pursue the full range of post-secondary and career education opportunities.
1 – Evaluate scientific constructs including conclusions, conflicting data, controls, data, inferences, limitations, questions, sources of errors, and variables.
2 – Apply scientific methods in qualitative and quantitative analysis, data gathering, direct and indirect observation,

predictions, and problem identification.
3 – Explain the relationships between scientific theory, scientific principles and laws, in technology, and engineering.
D – Demonstrate the ability to select, apply, and convert systems of measurement to solve problems.
1 – Apply scalar and vector quantities as applied to physical systems, such as the relationship between position, velocity, and acceleration.
2 – Apply fundamental laws and principles relevant to engineering and technology.
E – Demonstrate the ability to use Newton's Laws of Motion to analyze static and dynamic systems with and without the presence of external forces.
1 – Use the laws of conservation of energy, charge, and momentum, to solve a variety of problems involving mechanical, fluid, chemical, biological, electrical, and thermal systems.
2 – Use the relationships between energy, work, and power to solve a variety of problems involving mechanical, fluid, electrical, and thermal systems.

II – Communications
B – Apply active listening skills to obtain and clarify information.
1 – Interpret a given verbal message/information.
3 – Model behaviors that demonstrate active listening.
D – Apply active listening skills to obtain or clarify information pertaining to plans, processes, projects, or designs.
2 – Respond and/or restate information that will clarify STEM techniques to be used and/or information to be applied to projects, plans, or processes.

III – Problem Solving and Critical Thinking
B – Use mathematics, science, and technology concepts and processes to solve problems in projects involving design and/or production (e.g. medical, agricultural, biotechnological, energy and power, information and communication, transportation, manufacturing, and construction).
1 – Apply the core concepts of technology and recognize the relationships with STEM systems (e.g. systems, resources, criteria and constraints, optimization and trade-off, and controls).

IV – Information Technology Applications
D – Evaluate and use skills relating to the differing technological tools used to manipulate, report, or operate with data acquisition.
3 – Apply a currently applicable computer programming language to a process, project, plan, or issue as assigned.
4 – Apply statistical tools that verify the reliability or validity of the data used or collected in the plan, project, process, or problem.

VII – Leadership and teamwork
A – Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.
1 – Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.
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1 – Develop goals and objectives.
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C – Apply concepts and processes for the application of technology to engineering.
1 – Use knowledge, techniques, skills, and modern tools necessary for engineering practice.
2 – Describe the elements of good engineering practice (e.g. understanding customer needs, planning requirements analysis, using appropriate engineering tools, prototyping, test, evaluation, and verification).
3 – Demonstrate the ability to characterize a plan and identify the necessary engineering tools that will produce a technical solution when given a problem statement.
4 – Effectively use project management techniques (e.g. working in teams, appropriate time management practices, effective organizational skills, conduct analysis of cost, resources, and production capacity, and quality practices with continuous improvement).
5 – Use and calibrate probes, sensors, measuring systems, and devices to collect data using traceable standards.
6 – Explain the impact of error in measurement, predict the effect of error propagation in calculations, and record data with the correct number of significant digits.

8 – Use, handle, and store tools and materials correctly, perform preventative maintenance, understanding the results of negligence and improper maintenance or improper calibration.

E – Applied Mathematics

1 – Demonstrate knowledge of mathematical operations

2 – Demonstrate knowledge of geometry

3 – Demonstrate knowledge of trigonometry

F – Identify Measurements

2 – Calculate unit conversion

I Know Students will know about….	**I Can** Students will be able to……
1. Why is it crucial for designers and engineers to utilize statistics throughout the design process? 2. Statistical process control is applied in order to monitor and control a process. Monitoring and controlling a process ensures that it operates at its full potential. At its full potential, the process can make as much conforming product as possible with a minimum of waste. 3. Why is theory-based data interpretation valuable in decision making? 4. Why is experiment-based data interpretation valuable in decision making?	1. Calculate the theoretical probability that an event will occur. 2. Calculate the experimental frequency distribution of an event occurring. 3. Apply the Bernoulli process to events that only have two distinct possible outcomes. 4. Apply AND, OR, and NOT logic to probability. 5. Apply Bayes' theorem to calculate the probability of multiple events occurring. 6. Create a histogram to illustrate frequency distribution. 7. Calculate the central tendency of a data array, including mean, median, and mode. 8. Calculate data variation, including range, standard deviation, and variance.

Phase III Textbook/Materials

Materials provided by Project Lead The Way. No textbook is used.

Phase IV Summative Assessment Evidence

Common Summative Unit Assessments:	**Agreed Upon Interim Summative Assessments:** (*identifies Performance Task)

Phase V Learning Plan