Principles of Engineering

UNIT/ Weeks	Timeline/Topics	Essential Questions
8	Statistics and Kinematics • Statistics • Kinematics	• Why is it crucial for designers and engineers to use statistics throughout the design process? • Why is process control a necessary statistical process for ensuring product success? • Why is theory-based data interpretation valuable in decision making? • Why is experiment-based data interpretation valuable in decision making?
12	Energy and Power • Mechanisms • Energy Sources • Energy Applications	• What are some different types of occupations within the engineering pathway? • What are some common responsibilities of engineers? • Identify a mechanism in your household. Why do you think that particular mechanism is designed the way it is? • What are some strategies that can be used to make everyday mechanisms more efficient? • Describe one situation in which an engineer would want to include a mechanism with a mechanical advantage greater than one? What is the advantage in this case? • How could designing a solution to a mechanical problem without regard to efficiency be problematic?
3	Control Systems • Machine Control • Fluid Power	• What are the advantages and disadvantages of using programmable logic to control machines versus monitoring and adjusting processes manually? • What are some seemingly simple devices that contain microprocessors, and what function do the devices serve? • What questions must designers ask when solving problems to decide between digital or analog systems and between open or closed loop systems?
13	Materials and Structures • Statics • Material Properties • Material Testing	• Why is it crucial for designers and engineers to construct accurate free body diagrams of the parts and structures that they design? • Why must designers and engineers calculate forces acting on bodies and structures? • When solving truss forces, why is it important to know that the structure is statically determinate?