School District of Marshfield Course Syllabus

Course Name: Principles of Engineering
Length of Course: 1 Year
Credit: 1

Program Goal(s):

Empower learners to be college and career ready through standards-based experiences in the classroom and career-based learning experiences with business and industry partners. Learners will engage through technology in design, building, problem-solving, repair or service, in a collaborative environment through theory and hands-on experiences.

Course Description:

This survey course of engineering exposes students to some of the major concepts they will encounter in a postsecondary engineering course of study. Students have an opportunity to investigate engineering and high-tech careers and to develop skills and understanding of course concepts. Students employ engineering and scientific concepts in the solution of engineering design problems. They develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges. Students also learn how to document their work and communicate their solutions to peers and members of the professional community.

Standards:

Wisconsin Technology & Engineering Broad Based (BB)

Standard	Learning Priority	Performance Indicators
BB1: Students will analyze the core concepts of technology.	BB1.a: Analyze and use technological systems.	BB1.a.2.e: Identify that systems have parts or components that work together to accomplish a goal. BB1.a.3.m: Identify inputs, processes, outputs and, at times, feedback components for technological systems. BB1.a.4.m: Explain how common energy, power and transportation systems have provisions that detect, bypass or compensate for failures within a system. BB1.a.5.h: Describe how systems can fail because of design flaws, defect parts, poorly matched parts or they were used beyond their design capabilities. BB1.a.6.h: Describe how the outputs of one subsystem are the inputs of another subsystem given a prominent energy, power and transportation system.
	BB1.b: Analyze and use tools and materials.	BB1.b.3.m: Students will describe how resources are the things needed to complete a task (e.g., tools, machines, materials, information, energy, people, capital and time). BB1.b.4.m: Use appropriate tools to measure and layout a piece of material (e.g., length, width, thickness, angles, circles, arcs and volume) within tolerances. BB1.b.5.h: Select appropriate resources and explain how trade-offs between competing values, such as availability, cost, desirability and waste influenced their decision. BB1.b.6.h: Choose and perform the material processing operations of forming (e.g., bending, pressing, drawing, rolling), bonding (e.g., gluing, soldering, brazing, spot welding, gas welding, arc welding), fastening (e.g., screws, nuts & bolts, rivets, clips, pins, nails) and finishing (e.g., surface preparation, cleaning, treatment, coating).
	BB1.c: Analyze and use mechanisms.	BB1.c.2.m: Explain the relationship between the inputs and outputs of linear, rotary and compound motion mechanisms in terms of direction, distance and force.

		BB1.c.3.m: Define mechanical concepts such as force, work, power, torque, velocity, mechanical advantage and gear ratio. BB1.c.4.h: Build, test and trouble shoot simple linear, rotary and compound mechanisms. BB1.c.5.h: Given a linear, rotary and/or compound motion mechanism, students will measure and calculate units such as work, power, torque, gear ratios and mechanical advantage.
	BB1.d: Analyze and use electricity and electronic systems.	BB1.d.2.m: Define basic electrical concepts (i.e., voltage, direct and alternating current, resistance, power, polarity, conductor, insulator, series circuit, parallel circuit, series-parallel circuit, inductance, capacitance, continuity, digital, analog). BB1.d.3.m: Measure current, voltage and resistance in series, parallel and series-parallel circuits and components. BB1.d.4.m: Locate and identify shorts to power & ground, opens and high resistance problems in circuits and components. BB1.d.5.h: Describe the role of thermal, optical and mechanical transducers in sending electrical control signals to modify how a system performs. BB1.d.6.h: Perform a voltage drop test and describe the relationship between voltage, current and resistance with a multimeter. BB1.d.7.h: Inspect and test components such as switches, connectors, relays, solid state devices and conductors and take appropriate action.
	BB1.e: Analyze, explain and use control systems.	BB1.e.3.m: Explain how control systems sense what is happening in a system, compare it to what people want to happen within the system and trigger subsystems that will make needed adjustments. BB1.e.4.m: Explain how quality control is a planned process to ensure that a product, service or system meets established criteria. BB1.e.5.h: Identify the multiple controls that sense information from a number of areas, evaluate the

		system and act accordingly given a flawed complex system. BB1.e.6.h: Select and perform an appropriate maintenance is the process in order for the product or system to continue functioning properly, to extend its life or to upgrade its capability given a flawed product or system.
	BB1.f: Identify and analyze structures.	BB1.f.2.e: Recognize that materials have properties that inspire their use in structures (e.g. wood, plastic, aluminum, brick, concrete, cast iron, steel). BB1.f.3.m: Identify and describe basic types of structures (i.e., mass, bearing wall, framed) as they relate to their function. BB1.f.4.m: Use scientific inquiry to test, collect data and make conclusions about the performance of different materials and their application in the making of structures (i.e., tensile, compression, sheer testing). BB1.f.5.h: Calculate and define the different loads acting on structures (i.e., static, dynamic, stress, strain, compression, tension). BB1.f.6.h: Justify the application of structural materials and their trade-offs in the design of structures based on design requirements through optimization (i.e., engineering design process).
Wisconsin Technology & Engineering - Engineering (ENG)		
Standard	**Learning Priority**	**Performance Indicators**
Standard: ENG1: Students will analyze and demonstrate the attributes of design.	ENG1.a: Analyze engineering design theory.	ENG1.a.5.m: Design is a creative planning process that leads to useful products and systems. ENG1.a.6.m: There is no perfect design. ENG1.a.7.m: Explain how the design process has many criteria which ultimately lead to a solution. ENG1.a.8.m: Requirements for a design are made up of criteria and constraints. ENG1.a.9.h: Examine how the design needs to continually be evaluated and the ideas of the design must be redefined and improved. ENG1.a.10.h: Interpret design problems are seldom presented in a clearly defined form.

		ENG1.a.11.h: Argue design processes vary slightly. However, key elements of any design process include: defining a problem, identifying criteria, generating solutions, creating a model or prototype, testing and evaluating, refining the design and communicating processes and results. ENG1.a.12.h: Requirements of a design, such as criteria, constraints and efficiency, sometimes compete with each other.
Standard: ENG2: Students will analyze and demonstrate engineering design.	ENG2.a: Analyze the attributes of engineering design.	ENG2.a.3.m: Design involves a set of steps, which can be performed in different sequences and repeated as needed. ENG2.a.4.m: Examine how brainstorming is an individual or group design process step used to generate ideas to solve a problem. ENG2.a.5.m: Discuss the engineering design process involves defining a problem, generating ideas, selecting a solution, testing the solution(s), making the item, evaluating it and presenting the results. ENG2.a.6.h: Established design principles are used to evaluate existing designs, to collect data and to guide the design process ENG2.a.7.h: Recognize that engineering design is influenced by personal characteristics, such as creativity, resourcefulness and the ability to visualize and think abstractly. ENG2.a.8.h: Analyze the process of engineering design accounts for a number of factors to make decisions.
	ENG2.b: Describe and apply engineering design.	ENG2.b.3.m: Modeling, testing, evaluating and modifying are used to transform ideas into practical solutions. ENG2.b.4.h: A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.
Standard: ENG3: Students will demonstrate and analyze the role of troubleshooting, research and development, invention and	ENG3.a: Discuss the importance of the problem solving process.	ENG3.a.4.m: Explain troubleshooting is a problem-solving method used to identify the cause of a malfunction in a system.

innovation and experimentation in problem solving.		ENG3.a.5.h: Explain technological problems must be researched before they can be solved. ENG3.a.6.h: Not all problems are technological and not every problem can be solved using technology. ENG3.a.7.h: Research and development is a specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.
	ENG3.b: Analyze the procedures for innovation and invention.	ENG3.b.3.m: Invention is a process of turning ideas and imagination into devices and systems. Innovation is the process of modifying an existing product or system to improve it. ENG3.b.4.m: Explain some technological problems are best solved through experimentation. ENG3.b.5.h: Describe how many technological problems require a multidisciplinary approach.
Standard: ENG4: Students will develop abilities to apply the design process.	ENG4.a: Research the background information of a proposed design.	ENG4.a.3.m: Specify criteria and constraints for the design. ENG4.a.4.m: Demonstrate two-dimensional and three-dimensional representations of the designed solution. ENG4.a.5.h: Identify the design problem to solve and determine how to address it. ENG4.a.6.h: Identify criteria and constraints and determine how these will affect the design process.
	ENG4.b: Design solutions based on gathered information.	ENG4.b.3.m: Apply a design process to solve problems in and beyond the laboratory-classroom. ENG4.b.4.h: Refine a design by using prototypes and modeling to ensure quality, efficiency and productivity of the final product. ENG4.b.5.h: Develop and produce a product or system using a design process.
	ENG4.c: Evaluate completed solutions and provide feedback.	ENG4.c.4.m: Test and evaluate the design in relation to pre-established criteria and constraints and refine as needed. ENG4.c.5.m: Make a product or system and document the solution. ENG4.c.6.h: Evaluate final solutions and communicate observation, processes and results of the entire design process, using verbal, graphic, quantitative, virtual and

		written means, in addition to design models. ENG4.c.7.h: Evaluate the design solution using conceptual, physical and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.
Standard: ENG5: Students will develop the abilities to use and maintain technological products and systems.	ENG5.a: Use information to describe and design systems.	ENG5.a.4.m: Identify information provided in manuals, protocols or by experienced people to identify how things work. ENG5.a.5.m: Demonstrate and use tools, materials and machines safely to create, diagnose, adjust and repair systems. ENG5.a.6.h: Diagnose a system that is malfunctioning and use tools, materials, or machines to repair it. ENG5.a.7.h: Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.
	ENG5.b: Use tools to maintain systems.	ENG5.b.4.m: Operate and maintain systems in order to achieve a given purpose. ENG5.b.5.m: Use computers, calculators and technology in various applications. ENG5.b.6.h: Operate systems so that they function in the way they were designed. ENG5.b.7.h: Use computers and calculators to access, retrieve organize, process, maintain, interpret and evaluate data and information in order to communicate. ENG5.b.8.h: Troubleshoot, analyze and maintain systems to ensure proper function, accuracy and precision.
Standard: ENG6: Students will develop the abilities to assess the impact of products and systems.	ENG6.a: Collect information about products and systems.	ENG6.a.2.m: Design and use instruments and technology to gather data. ENG6.b.3.h: Collect information and evaluate its quality.
	ENG6.b: Interpret data from collected information to assess impacts of products and systems.	ENG6.b.4.m: Collect data to analyze and interpret trends in order to identify the positive and negative effects of a technology. ENG6.b.5.m: Identify trends and monitor potential consequences of technological development.

		ENG6.b.6.m: Interpret and evaluate the accuracy of the information obtained and determine if it is useful. ENG6.b.7.h: Synthesize data, analyze trends and draw conclusions regarding the effects of technology on the individual, society and the environment. ENG6.b.8.h: Use assessment techniques, such as trend analysis and experimentation, to make decisions about the future development of technology. ENG6.b.9.h: Design forecasting techniques to evaluate the results of altering natural systems.
Wisconsin Common Career Technical Standards (WCCTS)-Creativity, Critical Thinking, Communication and Collaboration (C)		
Standard	**Learning Priority**	**Performance Indicators**
Standard: 4C1: Students will think and work creatively to develop innovative solutions to problems and opportunities.	4C1.a: Develop original solutions, products and services to meet a given need.	4C1.a.4.m: Analyze elements of a problem to develop creative solutions. 4C1.a.6.m: Describe how past experiences can inform current problem solving. 4C1.a.7.h: Develop original ways to solve a given problem. 4C1.a.8.h: Design a product or service that could fulfill a human need or desire. 4C1.a.9.h: Apply past experiences to current problems in developing innovative solutions.
	4C1.b: Work creatively with others to develop solutions, products and services.	4C1.b.4.m: Explain how multiple people can develop better solutions than an individual. 4C1.b.5.m: Explain how multiple people and perspectives can develop better ideas than an individual. 4C1.b.6.m: Explain how multiple people and perspectives can improve an existing product or process better than an individual. 4C1.b.7.h: Incorporate the skills and experiences of others to develop a new solution to a problem. 4C1.b.8.h: Work as part of a team to design a product or service that could fulfill a human need or desire. 4C1.b.9.h: Work as part of a team to improve an existing product or process.
Standard: 4C2: Students will formulate and defend judgments and	4C2.a: Develop effective resolutions for a given problem, decision or	4C2.a.5.m: Analyze symptoms to identify the root cause of a problem.

decisions by employing critical thinking skills.	opportunity using available information.	4C2.a.6.m: Develop multiple resolutions for a given problem, decision or opportunity. 4C2.a.7.m: Identify problems that became worse due to poorly thought out or poorly informed solutions. 4C2.a.8.m: Explain how implementation of a solution or action may affect one or more corresponding systems. 4C2.a.9.m: Explain how different resolutions may be appropriate under different circumstances. 4C2.a.10.m: Explain the process for choosing an action or making a decision. 4C2.a.11.h: Determine the information needed to address an identified problem. 4C2.a.12.h: Contrast the benefits and drawbacks of various proposed resolutions to a given situation. 4C2.a.13.h: Predict how an action could result in unintended consequences, both positive and negative. 4C2.a.14.h: Analyze the impact of a decision using a systems thinking model. 4C2.a.15.h: Determine the best resolution for a problem, decision or opportunity based on given criteria. 4C2.a.16.h: Defend an action taken or a decision implemented.
	4C2.b: Develop and implement a resolution for a new situation using personal knowledge and experience.	4C2.b.3.m: Analyze problems to determine what past experiences might be related and relevant. 4C2.b.4.m: Analyze a problem to determine how it relates to existing knowledge. 4C2.b.5.h: Apply past experience to develop a course of action for a new situation. 4C2.b.6.h: Use existing knowledge to develop a resolution for a new situation, problem or opportunity.
Standard: 4C3: Students will communicate and collaborate with others to accomplish tasks and develop solutions to problems and opportunities.	4C3.a: Communicate thoughts and feelings with others using verbal and non-verbal language.	4C3.a.8.m: Implement effective listening skills in resolving a situation. 4C3.a.9.h: Develop a mutually acceptable response to a question or problem. 4C3.a.11.h: Communicate effectively in the presence of a language barrier.

		4C3.a.12.h: Utilize effective listening skills in creating consensus in a group.
	4C3.b: Work collaboratively with others.	4C3.b.4.m: Use idea generating practices as part of a group. 4C3.b.5.m: Describe ways to facilitate group collaboration. 4C3.b.6.m: Demonstrate the use of various tools to communicate effectively with an individual or a group. 4C3.b.7.h: Participate in group processes to generate consensus. 4C3.b.8.h: Lead group processes to generate consensus.
	4C3.c: Use interpersonal skills to resolve conflicts with others in an ethical manner.	4C3.c.5.m: Contribute to resolving conflicts that occur within a team or group. 4C3.c.6.m: Explore the ethical considerations of a current or historical action or decision. 4C3.c.7.h: Resolve conflicts productively with individuals as they arise. 4C3.c.8.h: Lead a team or group through a conflict resolution process to reach a productive outcome.
Wisconsin Common Career Technical Standards (WCCTS)-Career Development (CD)		
Standard	**Learning Priority**	**Performance Indicators**
Standard: CD1: Students will consider, analyze and apply an awareness of self, identity and culture to identify skills and talents.	CD1.a: Identify person strengths, aptitudes and passions.	CD1.a.2.m: Assess personal strengths, aptitudes and passions related to potential future careers CD1.a.3.h: Evaluate various occupations and career pathways to identify personal, academic and career goals based on personal strengths, aptitudes and passions.
	CD1.b: Demonstrate effective decision-making, problem solving and goal setting.	CD1.b.4.m: Identify long and short-term goals. CD1.b.5.h: Use a decision-making and problem-solving model.
	CD1.c: Interact effectively with others in similar and diverse teams.	CD1.c.7.m: Display cooperative behavior and identify personal strengths and assets in groups. CD1.c.11.h: Evaluate how the personal strengths and assets of others contribute to a cooperative group atmosphere. CD1.c.12.h: Assess how respect and appreciation for individual and cultural differences impacts group processes.
	CD1.d: Apply a range of relevant decision-making strategies.	CD1.d.4.m: Apply decision-making strategies to personal and team interactions.

		CD1.d.5.h: Predict the outcome of various decisions on personal, social and career success. CD1.d.6.h: Evaluate the impact of personal decision-making strategies on specific outcomes.
Standard: CD2: Students will identify the connection between educational achievement and work opportunities in order to reach personal and career goals.	CD2.a: Apply academic experiences to the world of work, inter-relationships and the community.	CD2.a.2.m: Describe a diverse range of opportunities available beyond high school. CD2.a.3.h: Evaluate how performance and connections within the learning community enhance future opportunities. CD2.a.4.h: Determine those opportunities that best support attainment of a specific career goal.
	CD2.b: Assess attitudes and skills that contribute to successful learning in school and across the life span.	CD2.b.5.m: Apply academic information from a variety of sources to enhance career preparedness and lifelong learning. CD2.b.6.m: Research local and regional labor market and job growth information to analyze career opportunities. CD2.b.7.h: Interpret and analyze the impact of current education, training and work trends on life, learning and career plans. CD2.b.8.h: Assess education and training opportunities to acquire new skills necessary for career advancement. CD2.b.9.h: Analyze local and regional labor market and job growth information to select a career pathway for potential advancement.
Standard: CD3: Students will create and manage a flexible and responsive individualized learning plan to meet their career goals.	CD3.a: Investigate the world of work in order to gain knowledge of self in order to make informed career decisions.	CD3.a.5.m: Demonstrate the ability to use technology to retrieve and manage career information that inspires educational achievement. CD3.a.6.m: Build an ongoing awareness of personal abilities, skills, interests and motivation and determine how these fit with chosen career pathway. CD3.a.7.m: Develop an individual learning plan to enhance educational achievement and attain career goals based on a career pathway. CD3.a.9.m: Use assessment results in educational planning including career awareness. CD3.a.10.h: Analyze how career plans may be affected by personal growth, external events and changes in motivations and aspirations.

		CD3.a.11.h: Apply academic and employment readiness skills in work-based learning situations such as internships, shadowing and/or mentoring experiences. CD3.a.12.h: Evaluate changes in local, national and global employment trends, societal needs and economic conditions related to career planning. CD3.a.14.h: Implement an individual learning plan to maximize academic ability and achievement.
	CD3.b: Examine and evaluate opportunities that could enhance life and career plans and articulate plan to guide decisions and actions.	CD3.b.2.m: Describe educational levels (e.g., work-based learning, certificate, two-year, four-year and professional degrees) and performance skills needed to attain personal and career goals. CD3.b.3.m: Demonstrate openness to exploring a wide range of occupations and career pathways. CD3.b.4.h: Implement strategies for responding to transition and change with flexibility and adaptability. CD3.b.5.h: Evaluate the relationship between educational achievement and career development.
	CD3.c: Employ career management strategies to achieve future career success and satisfaction.	CD3.c.3.m: Identify work values and needs. CD3.c.4.m: Define adaptability and flexibility in the world of work. CD3.c.5.h: Determine how principles of equal opportunity, equity, respect, inclusiveness and fairness, affect career planning and management. CD3.c.6.h: Discuss how adaptability and flexibility, especially when initiating or responding to change, contributes to career success.
Standard: CD4: Students will identify and apply employability skills.	CD4.a: Identify and demonstrate positive work behaviors and personal qualities needed to be employable.	CD4.a.4.m: Demonstrate flexibility and willingness to learn new knowledge and skills. CD4.a.5.m: Identify positive work-qualities typically desired in each of the career cluster's pathways. CD4.a.6.h: Evaluate how self-discipline, self-worth, positive attitude and integrity displayed in a work situation affect employment status. CD4.a.7.h: Assess how flexibility and willingness to learn new knowledge and skills affect employment status.

		CD4.a.8.h: Apply communication strategies when adapting to a culturally diverse environment. CD4.a.9.h: Use positive work-qualities typically desired in each of the career cluster's pathways. CD4.a.10.h: Manage work roles and responsibilities to balance them with other life roles and responsibilities.
	CD4.b: Demonstrate skills related to seeking and applying for employment to find and obtain a desired job.	CD4.b.3.m: Use technology to assist in career exploration and job-seeking activities. CD4.b.4.m: Compare and contrast personal attributes with employment needs and trends. CD4.b.5.h: Use multiple resources to locate job opportunities. CD4.b.6.h: Prepare a resume, cover letter, employment application. CD4.b.7.h: Employ critical thinking and decision-making skills to exhibit qualifications to a potential employer in an interview.
	CD4.c: Identify and exhibit traits for retaining employment.	CD4.c.3.m: Distinguish between appropriate behaviors in a social vs. professional setting. CD4.c.4.h: Model behaviors that demonstrate reliability and dependability. CD4.c.5.h: Maintain appropriate dress and behavior for the job to contribute to a safe and effective workplace/jobsite. CD4.c.6.h: Complete required employment forms and documentation. CD4.c.7.h: Summarize key activities necessary to retain a job in an industry.
	CD4.d: Develop positive relationships with others.	CD4.d.4.m: Use cooperative behavior in helping peers accomplish goals and tasks. CD4.d.5.h: Participate in co-curricular and community activities to enhance the school experience. CD4.d.6.h: Evaluate the best method to assist co-workers in accomplishing goals and tasks. CD4.d.7.h: Examine the skills required to enable students to successfully transition to post-secondary opportunities. CD4.d.8.h: Use a systematic approach to academic and career planning for students to achieve their

		learning, socio-cultural and work goals.
Wisconsin Common Career Technical Standards (WCCTS)-Environmental Health and Safety (EHS)		
Standard	**Learning Priority**	**Performance Indicators**
Standard: EHS1: Students will identify the importance and interrelationships of health, safety and environmental systems and evaluate the impacts of these systems on organizational performance for continuous improvement.	EHS1.d: Implement personal and jobsite safety rules and regulations to maintain and improve safe and healthful working conditions and environments.	EHS1.d.5.m: Recognize and use systems in school and in the community that protect and enhance personal, environmental health and safety. EHS1.d.6.m: Discuss employee rights and responsibilities and how to apply them in a workplace setting. EHS1.d.7.h: Assess workplace conditions with regard to personal and environmental health and safety. EHS1.d.8.h: Identify different workplace systems that protect and enhance personal and environmental health and safety. EHS1.d.9.h: Describe employee rights and responsibil-ities to maintain workplace health and safety, including compliance with rules and laws.

Key Vocabulary:			
Actual Mechanical Advantage	Decision Matrix	Gear	Ohm's Law
Absolute Pressure	Deformation	Histogram	Parallel Circuit
Acceleration	Design Brief	Hydraulics	Passive Solar Energy Collection
Accuracy	Design Process	Ideal Mechanical Advantage	Photocell
Algorithm	Design Statement	Idler Gear	Pinned Support
Alternative Energy	Deviation	Inclined Plane	Piston
Ampere	Digital Signal	Induction	Pitch
Analog Signal	Directional-Control Valve	Inexhaustible Energy	Pneumatics
Assembly	Displacement	Joint	Polarity
Atmospheric Pressure	Efficiency	Kinetic Energy	Potential Energy
Axial Stress	Effort Force	Lever	Potentiometer
Belt	Elastic Limit	Magnitude	Power
Biomass	Electrical Energy	Manufacturing	Pressure
Brainstorming	Electricity	Mean	Problem Statement
Centroid	Electromagnetic Energy	Mechanism	Proportional Limit
Chain	Elongation	Median	Pulley
Check Valve	Energy	Member	Qualitative Data

Closed Loop System	Feedback	Mode	Quantitative Data
Composite	Flow Rate	Modulus of Elasticity	Radiation
Compression	Flowchart	Moment	Renewable Energy
Conduction	Flow-Control Valve	Moment of Inertia	Reservoir
Constraint	Fluid Power	Nonrenewable Energy	Resilience
Convection	Free Body Diagram	Normal Distribution	Resistance
Crank	Friction	Normally Closed	Resistance Force
Current	Fuel Cell	Normally Open	Resultant Force
Cylinder	Fulcrum	Ohm	Roller Support
R-value	Solid Modeling	Stress-Strain Curve	Velocity
Scalar	Sprocket	Tension	Volt
Screw	Standard Deviation	Thermal Equilibrium	Voltage
Sense	Static Equilibrium	Thermodynamics	Volume
Sensor	Statically Indeterminate	Torque	Wedge
Series Circuit	Statistics	Transistor	Wheel and Axle
Shear Stress	Strain	U-value	Work
Simple Machine	Stress	Vector Quantity	

Topics/Content Outline- Units and Themes:

Quarter 1:

- Unit 1 Energy and Power
- Lesson 1.1 Mechanisms
- Lesson 1.2 Energy Sources

Quarter 2:

- Lesson 1.3 Energy Applications
- Lesson 1.4 Design Problem – Energy and Power
- Unit 2 Materials and Structures
- Lesson 2.1 Statics

Quarter 3:

- Lesson 2.2 Material Properties
- Lesson 2.3 Material Testing
- Lesson 2.4 Design Problem – Materials and Structures

Quarter 4:

- Unit 3 Control Systems
- Lesson 3.1 Machine Control
- Lesson 3.2 Fluid Power
- Lesson 3.3 Design Problem – Control Systems

- Unit 4 Statistics and Kinematics
- Lesson 4.1 Statistics
- Lesson 4.2 Kinematics

Primary Resource(s):

- Project Lead the Way: Principles of Engineering Curriculum