Black Horse Pike Regional School District
580 Erial Road, Blackwood, NJ 08012

Design and Technology III

COURSE OF STUDY

Technology Department

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DESIGN & TECHNOLOGY III

2026-2027 School Calendar

1. Intro Design Challenge
2. Advanced Machine, Tool, and Lab Safety
3. Research, Design, and Planning - Advanced Digital Design
4. Production for Manufacturing Project
5. Assembly and Finishing for Manufacturing Project
6. BHPRSD District Tech Challenge
7. Advanced 3D Modeling: 3D Model Tech Challenge Device - Assemblies and DWG's
8. Product Dissection - How It's Made
9. Introduction to House Wiring
10. Hydraulics and Fluid Power

September '26

Su	M	Tu	W	Th	F	S
		1	2	3	4	5
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27	28	29	30			

October '26

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November '26

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December '26

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January '27

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31						

February '27

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March '27

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April '27

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June '27

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27	28	29	30			

DESIGN & TECH III

BLACK HORSE PIKE REGIONAL SCHOOL DISTRICT

2026-2027 Course Syllabus

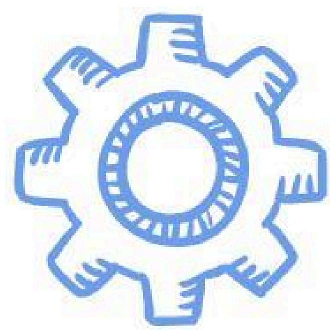
COURSE DESCRIPTION

11-12 Graders - Must have passed D&T I and D&T II
5 Credits

Design & Tech 3 is the third and highest-level Technology Education course offered to students who have successfully completed Design & Tech 1 and 2. In this course, students continue to refine their understanding of the Engineering Design Process as they research, plan, design, build, and test prototypes through a variety of advanced, hands-on design challenges. The course emphasizes a balance between design and fabrication, with students spending equal time developing ideas through research, sketching, and digital modeling while also constructing, testing, and refining their solutions in the lab. Students further expand their technical skills by learning to operate advanced tools and equipment that utilize modern manufacturing technologies, enabling them to create innovative solutions to complex design challenges.

UNITS COVERED

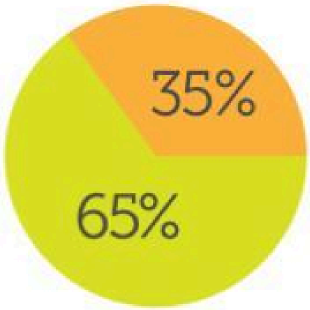
- Advanced Manufacturing
- Advanced Orthographic and Isometric Hand Drafting
- Advanced 3D Modeling and Digital Design
- Advanced AutoCAD
- Reverse Engineering
- Advanced Electrical Circuits
- House Wiring
- Fluid Power



MATERIALS NEEDED

- Pencil
- Two-Pocket Folder
- Safety glasses (supplied)

GRADING



CLASSWORK (65%): Anything you make or produce falls under this category including written assignments, quizzes, sketches and brainstorming activities, any computer-based work, and anything you build from your prototypes to your final designs.

PARTICIPATION (35%): You are expected to actively participate each and every day. Over a third of your grade is participation! Below are some pointers to help you succeed in class and earn full participation points every week.

LATE WORK

- Late work is -10% each day each day it is late, up to -50% (5 days late). Work can still be turned in after that, but will be -50%.
- Work more than two weeks late will not be accepted
- Up to teacher discretion.

ATTENDANCE

- If you are absent, or plan on being absent, it is your responsibility to see me during common time or email me and check Google Classroom.
- You will get extensions on assignments equal to the number of days you were out.
- You must arrive to class BEFORE the bell rings to be marked present. If you arrive after the bell, you are late to class.

TOP 10 WAYS TO EARN FULL PARTICIPATION POINTS

1. Keep quiet and pay attention during lectures, lessons and demonstrations
2. Ask questions if you're not sure what to do. If I am busy with someone else, try and look up the answer on your own or ask a classmate or partner (try to figure it out)
3. Each class we will have daily/weekly checkpoints. Make sure you know what they are and work to meet those checkpoints
4. When prompted to get to work, you should get to work within just a couple minutes. Any longer and you will lose participation points
5. Be productive and try your best. You should be working on your projects for this class for the majority of the period. Breaks are ok, but should be short and limited
6. Use school appropriate language and be mindful of your classmates
7. Follow BHPRSD cell phone and electronics policy
8. Arrive to class on time, prepared with all necessary materials and sit in your seat
9. Use tools, machinery, and classroom equipment correctly and safely
10. Have fun!

DESIGN & TECHNOLOGY DEPARTMENT

PERFORMANCE CHART

	ADVANCED	PROFICIENT	BELOW AVERAGE
GRADING GUIDE	A	B-C	D-F
EFFORT AND USE OF CLASS TIME **(Group or Individual)**	Extra effort during and after class time is put into project. Student(s) modeled exceptional behavior, were always on task, followed all safety rules, and helped others.	Consistent effort is put into the project during class time. Student(s) modeled good behavior, but was not always on task and misused equipment.	Inconsistent effort during class time. Student(s) did not use class time wisely, misused tools and machinery, and, as a result, missed checkpoints, deadlines and due dates.
ACCURACY AND NEATNESS	Project is prepared neatly and carefully. All measurements are accurate. Project is aesthetically pleasing and well built.	Project is fairly neat. Measuring is mostly accurate. Project is good. There is room for improvement.	Project is prepared with little care and lacks neatness. Project looks rushed and doesn't work as intended. Lots of room for improvement.
CREATIVITY	Project is original and imaginative. Design is unique, innovative and well thought out.	Project has some original elements. Design is somewhat clever but not entirely unique.	Project lacks creativity and thought. Design is not original and is more or less a copy of an existing one.
FOLLOWING INSTRUCTIONS, SPECIFICATIONS AND CONSTRAINTS	All project instructions have been followed. Every requirement has been met and exceeded.	Some project instructions and requirements met, but not all.	The majority of project instructions and requirements were not followed, have not been met, and project is incomplete.
DEMONSTRATES UNDERSTANDING	Student is extremely knowledgeable of project concepts and is able to help others.	Student displays knowledge of most concepts, methods and/or practices involved in the project.	Student lacks knowledge about project concepts, methods and practices.

9.3 – Career & Technical Education (CTE)
Content Area: 21^{st} Century Life and Careers

CONTENT AREA:	*STANDARD 9.3 CAREER AND TECHNICAL EDUCATION*
ARCHITECTURE & CONSTRUCTION CAREER CLUSTER®	
Number	**Standard statement**
By the end of Grade 12, Career and Technical Education Program completers will be able to:	
CAREER CLUSTER®:	*ARCHITECTURE & CONSTRUCTION (AC)*
9.3.12.AC.1	**Use vocabulary, symbols and formulas common to architecture and construction.**
9.3.12.AC.2	**Use architecture and construction skills to create and manage a project.**
9.3.12.AC.3	**Comply with regulations and applicable codes to establish and manage a legal and safe workplace.**
9.3.12.AC.4	**Evaluate the nature and scope of the Architecture & Construction Career Cluster and the role of architecture and construction in society and the economy.**
9.3.12.AC.5	**Describe the roles, responsibilities, and relationships found in the architecture and construction trades and professions, including labor/management relationships.**
9.3.12.AC.6	**Read, interpret and use technical drawings, documents and specifications to plan a project.**
9.3.12.AC.7	**Describe career opportunities and means to achieve those opportunities in each of the Architecture & Construction Career Pathways.**
PATHWAY:	*CONSTRUCTION (AC-CST)*
9.3.12.AC-CST.1	**Describe contractual relationships between all parties involved in the building process.**
9.3.12.AC-CST.2	**Describe the approval procedures required for successful completion of a construction project.**
9.3.12.AC-CST.3	**Implement testing and inspection procedures to ensure successful completion of a construction project.**
9.3.12.AC-CST.4	**Apply scheduling practices to ensure the successful completion of a construction project.**
9.3.12.AC-CST.5	**Apply practices and procedures required to maintain jobsite safety.**
9.3.12.AC-CST.6	**Manage relationships with internal and external parties to successfully complete construction projects.**
9.3.12.AC-CST.7	**Compare and contrast the building systems and components required for a construction project.**
9.3.12.AC-CST.8	**Demonstrate the construction crafts required for each phase of a construction project.**
9.3.12.AC-CST.9	**Safely use and maintain appropriate tools, machinery, equipment and resources to accomplish construction project goals.**

9.3 – Career & Technical Education (CTE)
Content Area: 21st Century Life and Careers

CONTENT AREA:	*STANDARD 9.3 CAREER AND TECHNICAL EDUCATION*
ARCHITECTURE & CONSTRUCTION CAREER CLUSTER®	
Number	**Standard statement**
PATHWAY:	*DESIGN/PRE-CONSTRUCTION (AC-DES)*
9.3.12.AC-DES.1	Justify design solutions through the use of research documentation and analysis of data.
9.3.12.AC-DES.2	Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.
9.3.12.AC-DES.3	Describe the requirements of the integral systems that impact the design of buildings.
9.3.12.AC-DES.4	Apply building codes, laws and rules in the project design.
9.3.12.AC-DES.5	Identify the diversity of needs, values and social patterns in project design, including accessibility standards.
9.3.12.AC-DES.6	Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
9.3.12.AC-DES.7	Employ appropriate representational media to communicate concepts and project design.
9.3.12.AC-DES.8	Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
PATHWAY:	*MAINTENANCE/OPERATIONS (AC-MO)*
9.3.12.AC-MO.1	Recognize and employ universal construction signs and symbols to function safely in the workplace.
9.3.12.AC-MO.2	Use troubleshooting procedures when solving a maintenance problem in buildings.
9.3.12.AC-MO.3	Apply construction skills when repairing, restoring or renovating existing buildings.
9.3.12.AC-MO.4	Determine work required to repair or renovate an existing building.
9.3.12.AC-MO.5	Plan and practice preventative maintenance activities to service existing buildings.
9.3.12.AC-MO.6	Maintain and inspect building systems to achieve safe and efficient operation of buildings.

UNIT OUTLINE

Design & Technology III

5 Credits
GRADES: 11-12
Prerequisite: Must have passed Design and Tech I and Design and Tech II

Course Introduction

Design & Tech 3 is the third and highest-level Technology Education course offered to students who have successfully completed Design & Tech 1 and 2. In this course, students continue to refine their understanding of the Engineering Design Process as they research, plan, design, build, and test prototypes through a variety of advanced, hands-on design challenges. The course emphasizes a balance between design and fabrication, with students spending equal time developing ideas through research, sketching, and digital modeling while also constructing, testing, and refining their solutions in the lab. Students further expand their technical skills by learning to operate advanced tools and equipment that utilize modern manufacturing technologies, enabling them to create innovative solutions to complex design challenges.

Course Content

1. Intro Design Challenge: A quick 2-3 open-ended design challenge where students team up with a partner and work together to solve a mini design challenge.

2. **MANUFACTURING UNIT: Advanced Machine, Tool, and Lab Safety**: This unit serves as a refresher of the machine and tool safety skills introduced in Design & Tech I and II while introducing students to more advanced equipment, including the miter saw, jointer, planer, router, table saw, and CNC machines. As students develop confidence and proficiency with these tools, they gain a better understanding of their capabilities and how they can be used to design, fabricate, and manufacture the components needed for the manufacturing unit.

3. **MANUFACTURING UNIT: Research, Design, and Planning - Advanced Digital Design**: This unit serves as a culmination of the skills and knowledge students developed in Design & Tech I and II by requiring them to apply their understanding of the planning and preparation stages of the manufacturing process. Students design, plan, and document a project for production using a digital design platform of their choice to create detailed 3D models of their designs. Working in both two- and three-dimensional spaces, students begin with hand sketches, refine their ideas into computer-generated models, and produce fully dimensioned and annotated technical drawings before beginning fabrication. Through this process, students strengthen their understanding of how engineers visualize, document, and communicate designs.

4. **MANUFACTURING UNIT: Production**: Prior to this unit, students learned how to safely operate advanced tools and machines and applied those skills to design and digitally model products for the Manufacturing Unit. This unit focuses on bringing those designs to life where students follow their plans, use appropriate fabrication techniques, and safely operate equipment to transform their digital models and technical drawings into functional, finished products.

5. **MANUFACTURING UNIT: Assembly and Finishing**: This unit serves as the final stage of the manufacturing process, where students assemble, refine, and finish the products they have designed and fabricated throughout the course. After completing the planning, modeling, machining, and construction phases, students focus on bringing their projects to completion through proper assembly techniques, surface preparation, finishing processes, and quality control. Students evaluate their work against design requirements, make final adjustments, and apply professional finishing techniques to improve the appearance, functionality, and durability of their products. Through this process, students gain a deeper understanding of how attention to detail and craftsmanship contribute to the success of a manufactured product.

6. **BHPRSD Tech Challenge**: The BHPRSD Tech Challenge is designed to guide students through the Engineering Design Process as they work in teams to solve an open-ended design challenge. Students begin by defining a problem, then collaborate to research, brainstorm, develop, test, and refine the most effective design solution. The unit culminates in a district-wide competition in which Design & Technology students from Highland, Triton, and Timber Creek compete to determine which team developed the most successful solution.

7. **Advanced 3D Modeling: 3D Model Tech Challenge Device - Assemblies and DWG's**: This unit provides students with the opportunity to continue expanding their skills in digital design, 3D printing, and the Engineering Design Process developed throughout all levels of Design and Tech. Students explore the more advanced tools and features within digital design software, with a greater emphasis on creating multi-part assemblies, exploded views, section views, and technical drawings to accurately document their designs. Through a series of hands-on design challenges, students strengthen their understanding of digital modeling workflows, tools, and commands while applying the Engineering Design Process to create, test, evaluate, and refine original 3D models.

8. **Product Dissection: How It's Made**: In this unit, students explore the engineering, design, and manufacturing decisions behind everyday products through hands-on product dissection and analysis. Students investigate how products are designed, manufactured, assembled, and improved by carefully examining their individual components, materials, mechanisms, and systems. Through the process of disassembling products, students identify how engineers use design choices, manufacturing methods, and material selection to create functional and reliable solutions.

9. **Introduction to House Wiring**: In this unit, students are introduced to the fundamentals of residential electrical systems and house wiring. Building on their knowledge of basic electronics and circuits, students explore how electrical power is generated, distributed, and safely delivered throughout a home. Students learn about electrical components, wiring methods, circuit layouts, electrical codes, and safety practices while developing an understanding of how engineers and electricians design reliable electrical systems. Through hands-on activities, students will interpret and create electrical schematics, wire basic residential circuits, and apply proper techniques for installing switches, outlets, lighting fixtures, and other electrical components.

10. **Hydraulics and Fluid Power**: In this unit, students explore the principles of hydraulics and fluid power while applying the Engineering Design Process to solve real-world engineering challenges. Students investigate how hydraulic systems use fluid pressure to transmit force and motion, and how engineers incorporate these systems into machinery and equipment used in manufacturing, construction, transportation, and automation. Students apply these concepts by designing, modeling, fabricating, and assembling a custom hydraulic-powered project. Using CAD software, students create detailed digital models before manufacturing components with a variety of modern fabrication technologies, including 3D printers, laser engravers, CNC machines, and traditional shop tools and equipment.

Course Expectations and Skills:

1. Keep and maintain an Engineering notebook, binder, or folder.
2. Apply and document the Engineering process while solving challenges.
3. Practice proper attitude and safe discipline.
4. Develop an acceptable degree of craftsmanship in each activity.
5. Participate and contribute equally to group generated solutions.
6. Apply and analyze science and math related concepts to the challenge.
7. Think creatively while solving real-world problems.
8. Learn from mistakes and view failures as opportunities to improve.
9. Base design decisions on evidence, testing, and data.
10. Balance creativity with functionality, safety, and efficiency.
11. Consider ethical, environmental, and economic impacts when developing solutions.
12. Prepare students to be successful in high school and higher level technology courses.

Resources:

"Technology Education: Learning by Design" by Michael Hacker & David Burghardt, 2008.

Black Horse Pike Regional School District Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Unit Title:	Advanced Machine, Tool, and Lab Safety
Course:	Design & Technology III
Grade Levels:	11-12
Last Revision:	Summer 2026

Unit Overview
This unit serves as a refresher of the machine and tool safety skills introduced in Design & Tech I and II while introducing students to more advanced equipment, including the miter saw, jointer, planer, router, table saw, and CNC machines. As students develop confidence and proficiency with these tools, they gain a better understanding of their capabilities and how they can be used to design, fabricate, and manufacture the components needed for the manufacturing unit.

Essential Questions	**Enduring Understandings**
Why is safety an essential part of working in a technology education laboratory?	Technology labs often involve tools, machines, materials, and processes that can create potential hazards if they are not used properly. Following safety procedures helps students identify risks, make responsible decisions, and prevent injuries
How can understanding how machines work help us operate them safely and effectively?	Equipment shall be used only as intended and within the specifications set forth by the manufacturer. If equipment is used improperly, this creates a dangerous working environment for the user and others nearby.
What role does personal protective equipment (PPE) play in preventing injuries?	Personal protective equipment (PPE) plays a critical role in preventing injuries by reducing exposure to hazards in the technology education laboratory. PPE acts as a protective barrier between students and potential dangers such as flying debris, sharp materials, excessive noise, heat, chemicals, and moving machine parts. While PPE does not replace safe operating procedures, proper use of equipment such as safety glasses, hearing protection, gloves, and protective clothing helps minimize the risk of injury and promotes a safe working environment.
How does machine safety connect to problem-solving and the engineering design process?	Throughout the design process, engineers identify potential hazards, establish safety criteria and constraints, select appropriate tools and procedures, and test solutions to ensure they work safely and effectively.

Learning Targets/Goals/Outcomes	Standards (NJSLS)
Safely use all tools and machines, as outlined in this unit.	8.2.12.ED.1 8.2.2.ITH.4 CTE - 9.3.12.AC.2
Understand the intended use and limitations of each machine and identify which machine is ideal for the task at hand.	8.2.12.ED.1 8.2.12.ED.5 8.2.2.ITH.4 CTE - 9.3.12.AC-CST.9
Apply knowledge of machine and tool safety, their intended use, and consider how parts can be designed more effectively using the Engineering Design Process.	8.2.12.ED.5 8.2.2.ITH.4

Interdisciplinary Connections
Science (ETS1.A), Career Readiness, Life Literacies & Key Skills (9.2.12.CAP.6)

21st Century Skills
In this unit, students continue to develop critical thinking skills, creativity, collaboration, communication, and problem-solving. Using the Engineering Design Process, students learn to use their knowledge of machine and tool safety to better analyze challenges, develop innovative solutions, and create prototypes. Ultimately, the focus of this unit is on safe decision making, workplace behavior, and effective communication.

Writing Assignments

- Sketching Assignments
- Safety Quizzes
- Reflection Assignments

Vocabulary - List Tier 2 (Academic Essentials)	Vocabulary - Tier 3 (Content-Specific)

• Blade
• Drill
• Table
• Stock/Workpiece
• PPE
	• Drill Press
	   ○ Chuck and Chuck Key
	   ○ RPM's and Feed Rate
	   ○ Table Height Adjustment Knob
	   ○ Vise and clamp
	   ○ Forstner and Twist Bit
	   ○ Thru-hole
	• Band Saw
	   ○ Blade Guard
	   ○ Blade Guard Lock
	   ○ Backing out of a cut
	   ○ Waste-side of a cut
	• Sander
	   ○ Oscillating Belt and Disc
	   ○ Sandpaper Grit
	   ○ Sequence of Abrasives

	- Miter Saw - Kerf - Bevel - Stop Block - Jointer - Infeed vs. Outfeed Table - Edge Joining - Face Joining - Warp, Bow, Twist, Cup - Planer - Depth of cut - Cutter Head - Feed Rollers - Infeed vs. Outfeed Table - Snipe - Grain Direction - Table Saw - Rip vs. Cross Cut - Fence - Miter Gauge - Kickback - SawStop - Blade Guard - Arbor - Riving Knife - Push Stick - Outfeed Table - CNC Machine - CNC (Computer Numerical Control) - CAD (Computer-Aided Design) - CAM (Computer-Aided Manufacturing) - G-code - Post Processor - Jogging - Toolpath - Coordinate system (X, Y, and Z Axis) - Zero (Home) - Work coordinate system - Machine coordinate system - Spindle - Router - Feed Rate - Depth of Cut

Activities, Instructional Strategies, and Assignments
“Go Slow to Go Fast” - early on in the unit, basic skills are taught, re-taught, and practiced often   - Hands-on Projects   - Reinforces measurement and layout   - Reinforces terms learned in the Digital Design Unit, like face, top, front, and side views, etc.   - Students practice using the machines safely using scrap wood before working on their projects   - Projects are designed to give students experience using machines like the miter saw, jointer, planer, table saw and CNC machine   - Whole-class, teacher-guided safety demonstrations   - POV Edpuzzle Safety videos   - Safety quizzes   - Question and Answer   - Whole class reviews and check-ins   - Do-nows   - Exit Tickets

Accommodations and Modifications (BHPRSD Accommodations and Modifications)
- Build background knowledge of content and vocabulary from familiar contexts prior to readings   - Provide oral & written instructions   - Incorporate multimedia/audio visual representation (YouTube, Discovery Education, TV Show parodies, etc.) to build understanding   - Use graphic organizers to guide notes, brainstorming, pre-writing, project planning, and test preparation   - Model through processes during assignments and elicit student-generated thoughts to determine gaps in understanding   - Highlight, bold, or underline main ideas in readings and in directions for writing assignments in the curricular areas   - Provide guiding questions to complete during the activity   - Provide chunking of instructional notes and activities to allow for formative assessment (checks for understanding) before moving on to the next stage   - Choose cooperative learning groups to ensure effective work, maximize productivity and support socialization   - Use multiple intelligences or the student's learning style to facilitate effective learning when a student is having difficulty grasping concepts   - Provide demonstrations, utilize pictures, or graphic to assist visual learners to support written text information   - Provide chunking of assignments into manageable steps, including checklists that clarify directions for assignments   - Provide a clear, concise version of a scoring rubric prior to the assignment or assessment   - Highlight distinctive features/key concepts   - Provide choice of projects depending on the student’s interests or strengths.   - Review, repeat, and clarify directions   - Chunk sections of assessment   - Allow for partial credit, when appropriate

Formative Assessments

Students are expected to keep an organized Engineering Design Notebook, folder, or binder. Prior to getting materials, students practice measurement and layout on paper before repeating that process on their workpiece. All handouts and work done with pencil and paper should be stored in the Engineering Design Notebook.
 	
1. Edpuzzle Safety Videos
2. Hands-on practice using each machine (with scrap wood)
    a. CNC Machining (*custom nameplate or sign*)
        i. Creating the artwork/text
        ii. Setting up VCarve File
        iii. Operating the CNC Machine
            1. Setting up clamps and spoilboard
            2. Installing the correct bit
        iv. ASsembly and finish
 	
Do-now’s and checkpoint quizzes will be given during and at the conclusion of these topics

Summative Assessments
• Final Project Prototype Evaluations completed at the very end of the Manufacturing Unit, including measurement, layout, safety, and accuracy of machining • Final Design Journal checks • Safety Quiz assessments

Black Horse Pike Regional School District Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Unit Title:	Research, Design, and Planning - Advanced Digital Design
Course:	Design & Technology III
Grade Levels:	11-12
Last Revision:	Summer 2026

Unit Overview
This unit serves as a culmination of the skills and knowledge students developed in Design & Tech I and II by requiring them to apply their understanding of the planning and preparation stages of the manufacturing process. Students design, plan, and document a project for production using a digital design platform of their choice to create detailed 3D models of their designs. Working in both two- and three-dimensional spaces, students begin with hand sketches, refine their ideas into computer-generated models, and produce fully dimensioned and annotated technical drawings before beginning fabrication. Through this process, students strengthen their understanding of how engineers visualize, document, and communicate designs using both traditional drafting methods and modern digital design tools.

Essential Questions	**Enduring Understandings**
How can two-dimensional drawings accurately represent three-dimensional objects?	Two-dimensional drawings accurately represent three-dimensional objects by using multiple standardized views, dimensions, and drawing conventions to clearly communicate an object's size, shape, and features.
How do engineers use orthographic sketches to communicate design ideas accurately?	Engineers use orthographic sketches to communicate design ideas accurately by representing an object with multiple standard views (front, top, and right side) that clearly define its size, shape, dimensions, and features.
How do standardized drawing practices improve collaboration among engineers, designers, and manufacturers?	Engineering drawings follow standardized drafting conventions and this provides a universal language that allows engineers, manufacturers, and technicians to interpret, manufacture, and assemble parts consistently and accurately.
How do technical drawings support brainstorming, prototyping, testing, and manufacturing?	Technical drawings clearly communicate design ideas, dimensions, and specifications, allowing engineers to visualize concepts, build accurate prototypes, evaluate performance, and manufacture parts consistently and precisely.
How do engineers and designers use their understanding of the entire manufacturing process to design products that are able to be manufactured?	Engineers and designers use their understanding of the entire manufacturing process to create products that can be efficiently produced by considering material selection, available tools and equipment, production methods, cost, tolerances, assembly requirements, and design constraints throughout the development process.

Learning Targets/Goals/Outcomes	Standards (NJSLS)
Visualize objects from multiple perspectives and translate them into orthographic views (front, top and side views).	8.2.8.ED.1 CTE - 9.3.MN.3
Identify missing views and determine the information needed to completely define a part.	8.2.8.NT.2
Use sketches to communicate ideas during the brainstorming and design phases of the Engineering Design Process.	8.2.8.ED.3 8.2.8.NT.2 CTE - 9.3.MN.3

Interdisciplinary Connections
English (RST.9-10.2 / RST.11-12.2), Math (HSG-MG.A.1 and HSG-MG.A.3), Science (HS-ETS1-2, HS-ETS1-3), History (6.3.12.CivicsPI.1), Career Readiness, Life Literacies & Key Skills (9.4.12.CI.1)

21st Century Skills
In this unit, students develop critical thinking skills, creativity, collaboration, communication, and problem-solving. Using the Engineering Design Process, students learn to analyze challenges, develop innovative solutions, create prototypes, and refine designs based on testing and feedback. Students build digital literacy, adaptability, and technical communication skills by using CAD software, operating emerging technologies, and presenting their design decisions.

Writing Assignments
• Sketching Assignments • Reflection Assignments • Individual and/or group Presentations

Vocabulary - List Tier 2 (Academic Essentials)	Vocabulary - Tier 3 (Content-Specific)
• Criteria • Constraint • Design • Create • Improve/Iterate • Prototype • Parallel • Perpendicular • Inch • Graduation • Tenths • Hundredths • Thousandths	• Sketch • Plane • Origin • Pan, Orbit, and Revolve • Extrude • Feature • Face • Fillet and Chamfer • Shell • Additive and Subtractive Manufacturing • Hole • Assemblies • Mate Features • Drawings (DWG's) • Dimension line • Section Views • Exploded Views

	• Annotations • Dial Caliper • Technical Drawing • Orthographic (Front, Top, Side, etc.) • Tolerance • Center Line • Ergonomics

Activities, Instructional Strategies, and Assignments
• "I Do, You Do, We Do" - Teacher guided instruction on a new skill, followed by students experimenting with the new skill(s) taught, and summed up as a whole class where students practice the skill again • "Go Slow to Go Fast" - early on in the unit, basic skills are taught, re-taught, and practiced often • Project based and self-exploration activities • Real life digital design challenges, assessments, and projects • Teacher guided instruction • Multiple Visual Examples • Question and Answer • Whole class reviews, check-ins, and student-led presentations • Independent, self-paced learning • Collaborative group (partner) design challenges • Do-nows • Exit Tickets

Accommodations and Modifications (BHPRSD Accommodations and Modifications)
• Provide a variety of concrete examples from familiar contexts • Build background knowledge of content and vocabulary from familiar contexts prior to readings • Use mental models to build understanding through familiar contexts • Provide oral & written instructions • Incorporate multimedia/audio visual representation (YouTube, Discovery Education, TV Show parodies, etc.) to build understanding • Use graphic organizers to guide notes, brainstorming, pre-writing, project planning, and test preparation • Model through processes during assignments and elicit student-generated thoughts to determine gaps in understanding • Highlight, bold, or underline main ideas in readings and in directions for writing assignments in the curricular areas • Provide guiding questions to complete during the activity • Provide chunking of instructional notes and activities to allow for formative assessment (checks for understanding) before moving on to the next stage • Choose cooperative learning groups to ensure effective work, productivity and support socialization • Use multiple intelligences or the student's learning style to facilitate effective learning when a student is having difficulty grasping concepts • Provide demonstrations, utilize pictures, or graphic to assist visual learners to support written text information • Include oral discussions, oral presentations, group collaboration, or other oral delivery methods to support auditory learners • Provide chunking of assignments into manageable steps, including checklists that clarify directions

for assignments

- Provide a clear, concise version of a scoring rubric prior to the assignment or assessment
- Highlight distinctive features/key concepts
- Provide choice of projects depending on the student's interests or strengths.
- Review, repeat, and clarify directions
- Chunk sections of assessment
- Allow for partial credit, when appropriate

Formative Assessments
Students are expected to keep an organized Engineering Design Notebook, folder, or binder. Designs and projects that are done on the computer will be submitted to Google Classroom and are still considered to be part of the student's Engineering Design Notebook. ● Hand Sketches ● 3D Models Parts ● 3D Model Assembly ● DWG's of 3D Modeled Parts ● DWG's of 3D Modeled Assembly 　○ Fully dimensioned and includes all annotations, section views, and exploded views Do-now's and checkpoint quizzes will be given during and at the conclusion of these topics Daily Design sketches and brainstorming activities Vocabulary checks and quizzes on 3D printing terminology and on Digital Design tools Exit tickets reflecting on challenges and solutions

Summative Assessments
Final 3D Model Project

Black Horse Pike Regional School District Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Unit Title:	Production
Course:	[Design & Technology III]()
Grade Levels:	11-12
Last Revision:	Summer 2026

Unit Overview
Prior to this unit, students learned how to safely operate advanced tools and machines and applied those skills to design and digitally model products for the Manufacturing Unit. This unit focuses on bringing those designs to life where students follow their plans, use appropriate fabrication techniques, and safely operate equipment to transform their digital models and technical drawings into functional, finished products.

Essential Questions	**Enduring Understandings**
Why is safety an essential part of working in a technology education laboratory?	Technology labs often involve tools, machines, materials, and processes that can create potential hazards if they are not used properly. Following safety procedures helps students identify risks, make responsible decisions, and prevent injuries
How can understanding how machines work help us operate them safely and effectively?	Equipment shall be used only as intended and within the specifications set forth by the manufacturer. If equipment is used improperly, this creates a dangerous working environment for the user and others nearby.
What role does personal protective equipment (PPE) play in preventing injuries?	Personal protective equipment (PPE) plays a critical role in preventing injuries by reducing exposure to hazards in the technology education laboratory. PPE acts as a protective barrier between students and potential dangers such as flying debris, sharp materials, excessive noise, heat, chemicals, and moving machine parts. While PPE does not replace safe operating procedures, proper use of equipment such as safety glasses, hearing protection, gloves, and protective clothing helps minimize the risk of injury and promotes a safe working environment.
How does machine safety connect to problem-solving and the engineering design process?	Throughout the design process, engineers identify potential hazards, establish safety criteria and constraints, select appropriate tools and procedures, and test solutions to ensure they work safely and effectively.

Learning Targets/Goals/Outcomes	Standards (NJSLS)
Safely use all tools and machines, as outlined in this unit.	8.2.12.ED.1 8.2.2.ITH.4 CTE - 9.3.12.AC.2
Understand the intended use and limitations of each machine and identify which machine is ideal for the task at hand.	8.2.12.ED.1 8.2.12.ED.5 8.2.2.ITH.4 CTE - 9.3.12.AC-CST.9
Apply knowledge of machine and tool safety, their intended use, and consider how parts can be designed more effectively using the Engineering Design Process.	8.2.12.ED.5 8.2.2.ITH.4

Interdisciplinary Connections
Science (ETS1.A), Career Readiness, Life Literacies & Key Skills (9.2.12.CAP.6)

21st Century Skills
In this unit, students continue to develop critical thinking skills, creativity, collaboration, communication, and problem-solving. Using the Engineering Design Process, students learn to use their knowledge of machine and tool safety to better analyze challenges, develop innovative solutions, and create prototypes. Ultimately, the focus of this unit is on safe decision making, workplace behavior, and effective communication.

Vocabulary - List Tier 2 (Academic Essentials)	Vocabulary - Tier 3 (Content-Specific)
Vocab is a culmination of the terms used in the previous units, as this unit is an extension of content and skills previously learned	

Activities, Instructional Strategies, and Assignments

- "Go Slow to Go Fast" - early on in the unit, basic skills are taught, re-taught, and practiced often
- Hands-on Projects
  - Reinforces measurement and layout
  - Reinforces terms learned in the Digital Design Unit, like face, top, front, and side views, etc.
  - Students practice using the machines safely using scrap wood before working on their projects
  - Projects are designed to give students experience using machines like the miter saw, jointer, planer, table saw and CNC machine
- Whole-class, teacher-guided safety demonstrations
- POV Edpuzzle Safety videos
- Safety quizzes
- Question and Answer
- Whole class reviews and check-ins
- Do-nows
- Exit Tickets

Accommodations and Modifications (BHPRSD Accommodations and Modifications)
● Build background knowledge of content and vocabulary from familiar contexts prior to readings ● Provide oral & written instructions ● Incorporate multimedia/audio visual representation (YouTube, Discovery Education, TV Show parodies, etc.) to build understanding ● Use graphic organizers to guide notes, brainstorming, pre-writing, project planning, and test preparation ● Model through processes during assignments and elicit student-generated thoughts to determine gaps in understanding ● Highlight, bold, or underline main ideas in readings and in directions for writing assignments in the curricular areas ● Provide guiding questions to complete during the activity ● Provide chunking of instructional notes and activities to allow for formative assessment (checks for understanding) before moving on to the next stage ● Choose cooperative learning groups to ensure effective work, maximize productivity and support socialization ● Use multiple intelligences or the student's learning style to facilitate effective learning when a student is having difficulty grasping concepts ● Provide demonstrations, utilize pictures, or graphic to assist visual learners to support written text information ● Provide chunking of assignments into manageable steps, including checklists that clarify directions for assignments ● Provide a clear, concise version of a scoring rubric prior to the assignment or assessment ● Highlight distinctive features/key concepts ● Provide choice of projects depending on the student’s interests or strengths. ● Review, repeat, and clarify directions ● Chunk sections of assessment ● Allow for partial credit, when appropriate

Formative Assessments
Students are expected to keep an organized Engineering Design Notebook, folder, or binder. Prior to getting materials, students practice measurement and layout on paper before repeating that process on their workpiece. All handouts and work done with pencil and paper should be stored in the Engineering Design Notebook. Do-now’s and checkpoint quizzes will be given during and at the conclusion of these topics Weekly Production and Quality Control Checks

Summative Assessments
● Final Project Prototype Evaluations completed at the very end of the Manufacturing Unit, including measurement, layout, safety, and accuracy of machining ● Final Design Journal checks

Black Horse Pike Regional School District Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Unit Title:	Assembly and Finishing
Course:	Design & Technology III
Grade Levels:	11-12
Last Revision:	Summer 2026

Unit Overview
This unit serves as the final stage of the manufacturing process, where students assemble, refine, and finish the products they have designed and fabricated throughout the course. After completing the planning, modeling, machining, and construction phases, students focus on bringing their projects to completion through proper assembly techniques, surface preparation, finishing processes, and quality control. Students evaluate their work against design requirements, make final adjustments, and apply professional finishing techniques to improve the appearance, functionality, and durability of their products. Through this process, students gain a deeper understanding of how attention to detail and craftsmanship contribute to the success of a manufactured product.

Essential Questions	**Enduring Understandings**
What role does personal protective equipment (PPE) play in preventing injuries?	Personal protective equipment (PPE) plays a critical role in preventing injuries by reducing exposure to hazards in the technology education laboratory. PPE acts as a protective barrier between students and potential dangers such as flying debris, sharp materials, excessive noise, heat, chemicals, and moving machine parts. While PPE does not replace safe operating procedures, proper use of equipment such as safety glasses, hearing protection, gloves, and protective clothing helps minimize the risk of injury and promotes a safe working environment.
How do engineers evaluate whether a manufactured product meets design requirements?	Engineers evaluate whether a manufactured product meets design requirements by testing its performance, inspecting its quality, comparing results to specifications and constraints, and making improvements based on data and feedback.
Why is it important to reflect on the manufacturing process after completing a project?	Reflecting on the manufacturing process after completing a project is important because it allows engineers to evaluate what worked, identify areas for improvement, learn from challenges, and apply those insights to create better designs and more efficient production processes in the future.

Learning Targets/Goals/Outcomes	Standards (NJSLS)
Follow technical drawings, plans, and specifications to accurately assemble a manufactured product.	8.2.12.ED.4 CTE - 9.3.ST.2
Apply proper assembly techniques to combine individual components into a complete functional product.	8.2.12.NT.1 CTE - 9.3.ST.1
Inspect completed products to determine whether they meet design criteria and manufacturing specifications.	8.2.12.ED.3

Interdisciplinary Connections
Science (ETS1.A), Career Readiness, Life Literacies & Key Skills (9.2.12.CAP.6)

21st Century Skills
In this unit, students continue to develop critical thinking skills, creativity, collaboration, communication, and problem-solving. Using the Engineering Design Process, students learn to use their knowledge of machine and tool safety to better analyze challenges, develop innovative solutions, and create prototypes. Ultimately, the focus of this unit is on safe decision making, workplace behavior, and effective communication.

Vocabulary - List Tier 2 (Academic Essentials)	Vocabulary - Tier 3 (Content-Specific)
Vocab is a culmination of the terms used in the previous units, as this unit is an extension of content and skills previously learned	

Activities, Instructional Strategies, and Assignments

- "Go Slow to Go Fast" - early on in the unit, basic skills are taught, re-taught, and practiced often
- Hands-on Projects
    - Reinforces measurement and layout
    - Reinforces terms learned in the Digital Design Unit, like face, top, front, and side views, etc.
    - Students practice using the machines safely using scrap wood before working on their projects
    - Projects are designed to give students experience using machines like the miter saw, jointer, planer, table saw and CNC machine
- Whole-class, teacher-guided safety demonstrations
- Question and Answer
- Whole class reviews and check-ins
- Do-nows
- Exit Tickets

Accommodations and Modifications (BHPRSD Accommodations and Modifications)

- Build background knowledge of content and vocabulary from familiar contexts prior to readings
- Provide oral & written instructions
- Incorporate multimedia/audio visual representation (YouTube, Discovery Education, TV Show parodies, etc.) to build understanding
- Use graphic organizers to guide notes, brainstorming, pre-writing, project planning, and test preparation
- Model through processes during assignments and elicit student-generated thoughts to determine gaps in understanding
- Highlight, bold, or underline main ideas in readings and in directions for writing assignments in the curricular areas
- Provide guiding questions to complete during the activity
- Provide chunking of instructional notes and activities to allow for formative assessment (checks for understanding) before moving on to the next stage
- Choose cooperative learning groups to ensure effective work, maximize productivity and support socialization
- Use multiple intelligences or the student's learning style to facilitate effective learning when a student is having difficulty grasping concepts
- Provide demonstrations, utilize pictures, or graphic to assist visual learners to support written text information
- Provide chunking of assignments into manageable steps, including checklists that clarify directions for assignments
- Provide a clear, concise version of a scoring rubric prior to the assignment or assessment
- Highlight distinctive features/key concepts
- Provide choice of projects depending on the student’s interests or strengths.
- Review, repeat, and clarify directions
- Chunk sections of assessment
- Allow for partial credit, when appropriate

Formative Assessments

Students are expected to keep an organized Engineering Design Notebook, folder, or binder. Prior to getting materials, students practice measurement and layout on paper before repeating that process on their workpiece. All handouts and work done with pencil and paper should be stored in the Engineering Design Notebook.

Do-now’s and checkpoint quizzes will be given during and at the conclusion of these topics

Weekly Production and Quality Control Checks

Summative Assessments

- Final Project Prototype Evaluations completed at the very end of the Manufacturing Unit, with specific attention to the final product and assembly/finishing operations
- Final Design Journal checks

Black Horse Pike Regional School District Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Unit Title:	BHPRSD Tech Challenge
Course:	Design & Technology III
Grade Levels:	11-12
Last Revision:	Summer 2026

Unit Overview
The BHPRSD Tech Challenge is designed to guide students through the Engineering Design Process as they work in teams to solve an open-ended design challenge. Students begin by defining a problem, then collaborate to research, brainstorm, develop, test, and refine the most effective design solution. The unit culminates in a district-wide competition in which Design & Technology students from Highland, Triton, and Timber Creek compete to determine which team developed the most successful solution.

Essential Questions	**Enduring Understandings**
What are the steps of the Engineering Design Process and how can this process be applied to solve a technological problem?	The Engineering Design Process can be used to solve a technological problem by following a structured series of steps that lead to an effective solution: 1. Identify the problem – Define the need or challenge and understand the criteria and constraints. 2. Research and gather information – Learn about the problem, existing solutions, and relevant technologies. 3. Brainstorm possible solutions – Generate multiple ideas without judging them initially. 4. Select the best solution – Evaluate ideas based on effectiveness, safety, cost, materials, and feasibility. 5. Develop a design – Create sketches, plans, or models that communicate the chosen solution. 6. Build a prototype – Construct a working model or first version of the design. 7. Test and evaluate – Determine whether the prototype meets the design criteria and identify areas for improvement. 8. Improve and redesign – Modify the design based on test results and feedback, repeating the process as needed.
What are the benefits and concerns involved with working on a team?	Working on a team promotes more diverse ideas, a shared workload, and collaboration, which leads to improved problem-solving. But working on a team can lead to conflict due to issues with communication.

How does the Engineering Design Process help us design, make and build products to solve problems?	The Engineering Design Process helps us design, make, and build products by providing a structured approach to solving problems. Engineers use this process to identify a need, research information, define requirements and constraints, brainstorm possible solutions, create and test prototypes, evaluate results, and improve their designs.
How can testing and iteration improve a design?	In typical manufacturing, a product is planned, tested and prototyped, which takes time, money and effort. With Digital Design, 3D prints can be produced quicker, iterated on faster, and reprinted to meet criteria, constraints and desired specifications.

Learning Targets/Goals/Outcomes	**Standards (NJSLS)**
Define the need or challenge and understand the criteria and constraints, as outlined on the Design Brief.	8.2.12.ED.1 8.2.5.ED.5
Research and gather information to learn about the problem, existing solutions, and relevant technologies.	8.2.12.ED.1 8.2.2.NT.2 8.2.5.ED.2 CTE - 9.3.12.AC-DES.1
Brainstorm and generate multiple ideas using the information gathered while researching the Design Challenge.	8.2.12.ED.1 8.2.2.NT.2 8.2.5.ED.2
Evaluate brainstormed ideas based on their effectiveness, safety, cost, materials, and feasibility, as well as how they relate to the criteria and constraints outlined on the Design Brief.	8.2.12.ED.1 8.2.2.NT.2 8.2.5.ED.2
Create sketches, plans, or models that communicate the chosen solution.	8.2.12.ED.2 8.2.5.ED.2 CTE - 9.3.12.AC.6
Use tools and machines safely and appropriately to construct a working model or first version of the design.	8.2.12.ED.4 8.2.2.ED.3 CTE - 9.3.12.AC-CST.9
Test and evaluate the prototype and make necessary adjustments and modifications to the prototype to better adhere to the criteria and constraints.	8.2.12.ED.5 8.2.12.ED.6 8.2.5.ITH.2 CTE - 9.3.12.AC-CST.3
Recognize that the Design Process is iterative in nature and this process is never truly completed, as designs can always be improved through innovation.	8.2.5.ED.6 8.2.12.ED.1 8.2.12.ED.2 8.2.12.ED.3 8.2.12.ED.4 8.2.12.ED.5 8.2.12.ED.6
Work collaboratively with others, sharing ideas and the workload evenly.	8.2.5.ED.2

Interdisciplinary Connections
English (RST.9-10.2 / RST.11-12.2), Math (HSG-MG.A.1), Science (MS-ETS1-1-4), Career Readiness, Life Literacies & Key Skills (NJSLS-CLKS 9.4)

21st Century Skills
In this unit, students continue to develop critical thinking skills, creativity, collaboration, communication, and problem-solving. Using the Engineering Design Process, students learn to analyze challenges, develop innovative solutions, create prototypes, and refine designs based on testing and feedback.

Writing Assignments
● Sketching Assignments ● Design Matrix Assignments ● Reflection Assignments ● Individual and/or group Presentations

Activities, Instructional Strategies, and Assignments
● Project based and self-exploration activities ● Real life digital design challenges, assessments, and projects ● Teacher guided instruction ● Lectures ● Multiple Visual Examples ● Question and Answer ● Whole class reviews, check-ins, and student-led presentations ● Collaborative group (partner) design challenges ● Do-nows ● Exit Tickets

Accommodations and Modifications (BHPRSD Accommodations and Modifications)
● Provide a variety of concrete examples from familiar contexts ● Build background knowledge of content and vocabulary from familiar contexts prior to readings ● Use mental models to build understanding through familiar contexts ● Provide oral & written instructions ● Incorporate multimedia/audio visual representation (YouTube, Discovery Education, TV Show parodies, etc.) to build understanding ● Use graphic organizers to guide notes, brainstorming, pre-writing, project planning, and test preparation ● Model through processes during assignments and elicit student-generated thoughts to determine gaps in understanding ● Highlight, bold, or underline main ideas in readings and in directions for writing assignments in the curricular areas ● Provide guiding questions to complete during the activity ● Choose cooperative learning groups to ensure effective work, productivity and support socialization

- Use multiple intelligences or the student's learning style to facilitate effective learning when a student is having difficulty grasping concepts
- Provide demonstrations, utilize pictures, or graphic to assist visual learners to support written text information
- Include oral discussions, oral presentations, group collaboration, or other oral delivery methods to support auditory learners
- Provide chunking of assignments into manageable steps, including checklists that clarify directions for assignments
- Provide a clear, concise version of a scoring rubric prior to the assignment or assessment
- Highlight distinctive features/key concepts
- Provide choice of projects depending on the student's interests or strengths.
- Review, repeat, and clarify directions
- Chunk sections of assessment
- Allow for partial credit, when appropriate

Formative Assessments

Students are expected to keep an organized Engineering Design Notebook, folder, or binder. Designs and projects that are done on the computer will be submitted to Google Classroom and are still considered to be part of the student's Engineering Design Notebook.

1. Daily Activity Log
2. Identifying the Problem
3. Research and Brainstorming
4. Materials Consideration Design Matrix
5. Thumbnail Sketch Design Matrix
6. Final Sketch of Desired Prototype
7. Build checkpoints
8. Team Name and Logo Sketches
9. Final Team Name and Logo
10. Testing and Modification Rationale

Do-now's and checkpoint quizzes will be given during and at the conclusion of these topics

Summative Assessments

Final Design Prototype Evaluations
End of Unit checks on Design Journals, documenting:

- Problem statement
- Criteria and constraints
- Design process
- Digital Design Development
- Testing, Modification, and Improvements made

Final presentation or design review (partners/small group)
Written reflection explaining design decisions (individual)

Black Horse Pike Regional School District Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Unit Title:	Advanced 3D Modeling: 3D Model Tech Challenge Device - Assemblies and DWG's
Course:	Design & Technology III
Grade Levels:	11-12
Last Revision:	Summer 2026

Unit Overview
This unit provides students with the opportunity to continue expanding their skills in digital design, 3D printing, and the Engineering Design Process developed throughout all levels of Design and Tech. Students explore the more advanced tools and features within digital design software, with a greater emphasis on creating multi-part assemblies, exploded views, section views, and technical drawings to accurately document their designs. Through a series of hands-on design challenges, students strengthen their understanding of digital modeling workflows, tools, and commands while applying the Engineering Design Process to create, test, evaluate, and refine original 3D models.

Essential Questions	**Enduring Understandings**
How are 3D parts designed using a Digital Design software, like TinkerCAD, Onshape, or Fusion?	The goal is to "move well to make well." Designs start as sketches, which are then extruded, and then modified (fillet, chamfer, etc.) and, depending on the complexity of the shape, this process could be repeated again and again.
With regards to editing existing parts, what are some of the benefits of using digital design as opposed to traditional manufacturing?	Unlike traditional manufacturing, digital design allows users to literally go back in time and edit features and geometries previously made. Once those edits are made, the part can be reprinted, tested, and iterated on. With traditional manufacturing, parts cannot be as easily edited once they are made and typically need to be remade from scratch, which takes more time and costs more money and effort.
What is the significance of standardization and proper dimensioning with regards to creating parts and Engineering Drawings?	Standardization and proper dimensioning are essential when creating parts and engineering drawings because they ensure accuracy, consistency, and clear communication between designers, engineers, and manufacturers. By following industry standards, designers can create parts that are compatible, repeatable, and able to be produced correctly regardless of who manufactures them.
How are section views used to detail parts and assemblies?	Section views show the internal features of a part or assembly by cutting away a portion of the object to reveal hidden details to show things like holes, pockets, and thicknesses.
How are exploded views used to detail parts and assemblies?	Exploded views separate the components of an assembly and display them in an organized arrangement to show how individual parts fit together to communicate assembly order and part relationships.

When using a digital design software, how do designers choose which tool is most effective/best for that part?	The great thing about digital design is that there are many ways to create a part or geometry and there's not one "right" answer. Some tools allow designers to make the part quicker, with greater accuracy, or, allow for easier edits and future changes to the part.
How does the Engineering Design Process help us design, make and build products to solve problems?	The Engineering Design Process helps us design, make, and build products by providing a structured approach to solving problems. Engineers use this process to identify a need, research information, define requirements and constraints, brainstorm possible solutions, create and test prototypes and evaluate and improve their designs.
How can testing and iteration improve a design?	In typical manufacturing, a product is planned, tested and prototyped, which takes time, money and effort. With Digital Design, 3D prints can be produced quicker, iterated on faster, and reprinted to meet criteria, constraints and desired specifications.

Learning Targets/Goals/Outcomes	**Standards (NJSLS)**
Use tools within a digital design software, like shell and hole to create more advanced design solutions to real-world problems.	8.2.12.ED.2
Use assembly tools within a digital design software, like mate features in Onshape to create advanced, multi-part assemblies.	8.2.12.ED.2
Use drawing and dimensioning tools within a digital design software, like the exploded view and section view tools in Onshape to create industry-standard, fully dimensioned drawings.	8.2.12.ED.2 CTE - 9.3.12.AC.6
Create a functional 3D printed part by first modeling the part, then exporting to a slicing software.	8.2.12.ED.1
Apply the Engineering Design Process to refine and iterate a design to better solve the real-world design challenge.	8.2.8.ED.2 8.2.12.ED.1 8.2.12.ED.4 8.2.12.ED.5 8.2.5.ITH.2
In digital design software, time and form are not linear. When problems arise, develop a plan to find a solution and experiment with tools and help features within the program, using appropriate vocabulary while doing so.	8.1.2.CS.3 8.1.2.AP.4

Interdisciplinary Connections
English (RST.9-10.2 / RST.11-12.2), Math (HSG-MG.A.1), Science (HS-ETS1-2, HS-ETS1-3), History (6.3.12.CivicsPI.1), Career Readiness, Life Literacies & Key Skills (9.4.12.CI.1)

21st Century Skills
In this unit, students continue to develop critical thinking skills, creativity, collaboration, communication, and problem-solving. Using the Engineering Design Process, students learn to analyze challenges, develop innovative solutions, create prototypes, and refine designs based on testing and feedback. Students build digital literacy, adaptability, and technical communication skills by using CAD software, operating emerging technologies, and presenting their design decisions.

Writing Assignments
• Sketching Assignments • Reflection Assignments • Individual and/or group Presentations

Vocabulary - List Tier 2 (Academic Essentials)	Vocabulary - Tier 3 (Content-Specific)
• Criteria • Constraint • Design • Create • Improve/Iterate • Prototype	• Sketch • Plane • Origin • Pan, Orbit, and Revolve • Extrude • Feature • Face • Fillet and Chamfer • Shell • Additive and Subtractive Manufacturing • Hole • Assemblies • Mate Features • Drawings (DWG's) • Dimension line • Section Views • Exploded Views • Annotations

Activities, Instructional Strategies, and Assignments
• "I Do, You Do, We Do" - Teacher guided instruction on a new skill, followed by students experimenting with the new skill(s) taught, and summed up as a whole class where students practice the skill again • "Go Slow to Go Fast" - early on in the unit, basic skills are taught, re-taught, and practiced often • Project based and self-exploration activities • Real life digital design challenges, assessments, and projects • Teacher guided instruction and lectures, including Q&A • Multiple Visual Examples • Whole class reviews, check-ins, and student-led presentations • Independent, self-paced learning • Collaborative group (partner) design challenges • Do-nows and Exit Tickets

Accommodations and Modifications (**BHPRSD Accommodations and Modifications**)
- Provide a variety of concrete examples from familiar contexts   - Build background knowledge of content and vocabulary from familiar contexts prior to readings   - Use mental models to build understanding through familiar contexts   - Provide oral & written instructions   - Incorporate multimedia/audio visual representation (YouTube, Discovery Education, TV Show parodies, etc.) to build understanding   - Use graphic organizers to guide notes, brainstorming, pre-writing, project planning, and test preparation   - Model through processes during assignments and elicit student-generated thoughts to determine gaps in understanding   - Highlight, bold, or underline main ideas in readings and in directions for writing assignments in the curricular areas   - Provide guiding questions to complete during the activity   - Provide chunking of instructional notes and activities to allow for formative assessment (checks for understanding) before moving on to the next stage   - Choose cooperative learning groups to ensure effective work, maximize productivity and support socialization   - Use multiple intelligences or the student's learning style to facilitate effective learning when a student is having difficulty grasping concepts   - Provide demonstrations, utilize pictures, or graphic to assist visual learners to support written text information   - Include oral discussions, oral presentations, group collaboration, or other oral delivery methods to support auditory learners   - Provide chunking of assignments into manageable steps, including checklists that clarify directions for assignments   - Provide a clear, concise version of a scoring rubric prior to the assignment or assessment   - Highlight distinctive features/key concepts   - Provide choice of projects depending on the student’s interests or strengths.   - Review, repeat, and clarify directions   - Chunk sections of assessment   - Allow for partial credit, when appropriate

Formative Assessments

Students are expected to keep an organized Engineering Design Notebook, folder, or binder. Designs and projects that are done on the computer will be submitted to Google Classroom and are still considered to be part of the student's Engineering Design Notebook.
 	
1. Creating multi-part assemblies - Submit links to project(s) to Google Classroom
2. Editing previously made multi-part assemblies - Submit links to project(s) to Google Classroom
3. Documenting Designs through DWG's - Submit links and exported PDF's of project(s) to Google Classroom
    a. Exploded views
    b. Section views
4. Reading Dimensions from Blueprints - handout
5. Creating advanced geometries, *like reverse engineering the Tech Challenge Devices* - Submit links to project(s) to Google Classroom
 	
Do-now's and checkpoint quizzes will be given during and at the conclusion of these topics
 	
Digital Design skill exercises (sketching, dimensioning, constraints, assemblies, and DWG's)
Design sketches and brainstorming activities
Vocabulary checks and quizzes on 3D printing terminology and on Digital Design tools
Exit tickets reflecting on challenges and solutions
Peer design critiques

Summative Assessments
Final Design Prototype Evaluations End of Unit checks on Design Journals, documenting: ● Problem statement ● Criteria and constraints ● Design process ● Digital Design Development ● Testing, Modification, and Improvements made Final presentation or design review (partners/small group) Written reflection explaining design decisions (individual)

Black Horse Pike Regional School District Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Unit Title:	Product Dissection: How It's Made
Course:	Design & Technology III
Grade Levels:	11-12
Last Revision:	Summer 2026

Unit Overview
In this unit, students explore the engineering, design, and manufacturing decisions behind everyday products through hands-on product dissection and analysis. Students investigate how products are designed, manufactured, assembled, and improved by carefully examining their individual components, materials, mechanisms, and systems. Through the process of disassembling products, students identify how engineers use design choices, manufacturing methods, and select materials to create functional and reliable products.

Essential Questions	**Enduring Understandings**
How can studying existing products help engineers design better solutions?	Studying existing products helps engineers design better solutions by allowing them to analyze successful features, identify weaknesses, understand materials and manufacturing processes, and apply those insights to create improved designs that are more functional, efficient, and user-focused.
What design decisions influence the function, performance, and success of a product?	Design decisions that influence the function, performance, and success of a product include material selection, shape and structure, size, manufacturing methods, cost, user needs, durability, safety, efficiency, and how well the individual components work together to create a reliable and effective solution.
How do engineers select materials and manufacturing processes based on product requirements?	Engineers select materials and manufacturing processes based on product requirements by evaluating factors such as strength, durability, weight, cost, appearance, environmental impact, and intended use, then choosing processes that can efficiently produce a reliable product that meets design specifications and constraints.

Learning Targets/Goals/Outcomes	**Standards (NJSLS)**
Disassemble and analyze products to identify individual components, materials, mechanisms, and systems.	8.2.12.NT.3
Identify the purpose and function of each component within a larger technological system.	8.2.12.NT.1 CTE - 9.3.MN.2
Analyze how product design decisions impact functionality, reliability, cost, and user experience.	8.2.12.ED.1 CTE - 9.3.MN.2

Interdisciplinary Connections
Math (HS-ETS1-1 and HS-ETS1-2), Science (HS-PS2-3)

21st Century Skills
In this unit, students develop critical thinking skills, creativity, collaboration, communication, and problem-solving. Using the Engineering Design Process, students learn to analyze challenges, develop innovative solutions, create prototypes, and refine designs based on testing and feedback. Students build digital literacy, adaptability, and technical communication skills by using CAD software, operating emerging technologies, and presenting their design decisions.

Writing Assignments
• Sketching Assignments • Project Proposals • Reflection Assignments • Individual and/or group Presentations

Vocabulary - List Tier 2 (Academic Essentials)	Vocabulary - Tier 3 (Content-Specific)
• Analyze • Evaluate • Investigate • Observe • Identify • Compare • Classify • Document • Describe • Explain • Interpret • Measure • Record • Disassemble • Form • Function • Purpose	• Reverse engineering • Product dissection • Product analysis • Design intent • Design specification • Engineering analysis • Component analysis • System analysis • Deconstruction • Function analysis • Failure analysis • Benchmarking • Redesign • Iterative design • Design evaluation • Product lifecycle • Component • Assembly • Subassembly • System • Subsystem • Fabrication • Production • Machining • Injection molding • Casting • Forming • Additive manufacturing

	• Subtractive manufacturing • Fastener • Adhesive • Tolerance • Quality control

Activities, Instructional Strategies, and Assignments
• Project based and self-exploration activities • Real life digital design challenges, assessments, and projects • Teacher guided instruction • Multiple Visual Examples • Question and Answer • Whole class reviews, check-ins, and student-led presentations • Independent, self-paced learning • Collaborative group (partner) design challenges • Do-nows • Exit Tickets

Accommodations and Modifications (BHPRSD Accommodations and Modifications)
• Provide a variety of concrete examples from familiar contexts • Build background knowledge of content and vocabulary from familiar contexts prior to readings • Use mental models to build understanding through familiar contexts • Provide oral & written instructions • Incorporate multimedia/audio visual representation (YouTube, Discovery Education, TV Show parodies, etc.) to build understanding • Use graphic organizers to guide notes, brainstorming, pre-writing, project planning, and test preparation • Model through processes during assignments and elicit student-generated thoughts to determine gaps in understanding • Highlight, bold, or underline main ideas in readings and in directions for writing assignments in the curricular areas • Provide guiding questions to complete during the activity • Provide chunking of instructional notes and activities to allow for formative assessment (checks for understanding) before moving on to the next stage • Choose cooperative learning groups to ensure effective work, productivity and support socialization • Use multiple intelligences or the student's learning style to facilitate effective learning when a student is having difficulty grasping concepts • Provide demonstrations, utilize pictures, or graphic to assist visual learners to support written text information • Include oral discussions, oral presentations, group collaboration, or other oral delivery methods to support auditory learners • Provide chunking of assignments into manageable steps, including checklists that clarify directions for assignments • Provide a clear, concise version of a scoring rubric prior to the assignment or assessment • Provide choice of projects depending on the student’s interests or strengths. • Review, repeat, and clarify directions • Chunk sections of assessment • Allow for partial credit, when appropriate

Formative Assessments

Students are expected to keep an organized Engineering Design Notebook, folder, or binder. Designs and projects that are done on the computer will be submitted to Google Classroom and are still considered to be part of the student's Engineering Design Notebook.
 	
1. "What is Reverse Engineering" - Fill-in-the-blank and follow-along class notes
2. "How It's Made"
3. Practicing Reverse Engineering
    a. Reverse Engineer a simple toy as a whole class
    b. Analyze the parts, assemblies, and materials used to create a functional part as a whole class
4. Reverse Engineering a Product
    a. Disassembly
    b. Exploded View Model
    c. Investigation and Research on How It's Made
 	
Do-now's and checkpoint quizzes will be given during and at the conclusion of these topics
 	
Daily Design sketches and brainstorming activities
Vocabulary checks and quizzes on 3D printing terminology and on Digital Design tools
Exit tickets reflecting on challenges and solutions

Summative Assessments
Final 3D Model Project Final 3D Dissected/Exploded Project

Black Horse Pike Regional School District Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Unit Title:	Introduction to House Wiring
Course:	Design & Technology III
Grade Levels:	11-12
Last Revision:	Summer 2026

Unit Overview
In this unit, students are introduced to the fundamentals of residential electrical systems and house wiring. Building on their knowledge of basic electronics and circuits, students explore how electrical power is generated, distributed, and safely delivered throughout a home. Students learn about electrical components, wiring methods, circuit layouts, electrical codes, and safety practices while developing an understanding of how engineers and electricians design reliable electrical systems. Through hands-on activities, students will interpret and create electrical schematics, wire basic residential circuits, and apply proper techniques for installing switches, outlets, lighting fixtures, and other electrical components.

Essential Questions	**Enduring Understandings**
How do electricians design and build electrical systems that are safe, reliable, and efficient?	Electricians design and build electrical systems that are safe, reliable, and efficient by following electrical codes and standards, selecting appropriate components and materials, planning circuits carefully, and testing electrical systems to ensure they function properly while minimizing risks.
How can Ohm's Law be used to predict and solve problems within a circuit?	Ohm's Law allows engineers and electricians to predict and solve circuit problems by calculating the relationship between voltage, current, and resistance to determine how electrical components will perform and ensure circuits operate safely and efficiently.
How can electricians troubleshoot and improve residential electrical systems when they do not function as expected?	Electricians troubleshoot and improve residential electrical systems by using schematics, testing equipment, and systematic problem-solving methods to identify issues, diagnose faults, repair or replace components, and make adjustments that improve safety, reliability, and efficiency.
How do electricians use electrical schematics to communicate, design, and troubleshoot complex electrical systems?	Electricians use electrical schematics to communicate, design, and troubleshoot complex electrical systems by creating and interpreting standardized diagrams that show how components are connected, how power flows through a system, and where potential issues may occur during installation, testing, and repair.

Learning Targets/Goals/Outcomes	Standards (NJSLS)
Read, interpret, and create electrical schematics using standard symbols.	8.2.12.ED.2 CTE - 9.3.12.AC.6
Use Ohm's Law to calculate and predict the behavior of electrical circuits.	8.2.5.ED.2 CTE - 9.3.12.AC.6
Design and build simple AC circuits using switches, outlets, lighting fixtures, and other electrical components.	8.2.12.ED.5 8.2.12.ED.6
Explain how individual components work together as part of a larger electrical system.	8.2.8.NT.3 CTE - 9.3.12.AC-CST.3
Demonstrate proper safety procedures when wiring residential circuits.	8.2.12.ED.4 8.2.2.ED.3

Interdisciplinary Connections
English (NJSLSA.W4), Math (NJSLS-M HSA-CED.A.1 and NJSLS-M HSA-CED.A.4), Science (HS-PS3-1-2)

21st Century Skills
In this unit, students continue to develop critical thinking skills, creativity, collaboration, communication, and problem-solving. Using the Engineering Design Process, students learn to analyze challenges, develop innovative solutions, create prototypes, and refine designs based on testing and feedback.

Writing Assignments

- Sketching Assignments
- Schematic Design Layouts
- Reflection Assignments
- Individual and/or group Presentations

Vocabulary - List Tier 2 (Academic Essentials)	Vocabulary - Tier 3 (Content-Specific)
• Component • System • Function • Process • Specifications • Input • Output • Connection	• Electron flow • Voltage (V) • Current (Amperage) • Resistance (Ω) • Power (Wattage) • Ohm's Law • Circuit • Load • Conductor • Insulator • Ground • Service panel • Electrical panel • Circuit breaker

	• Branch circuit • Feeder circuit • Service entrance • Hot wire • Neutral wire • Grounding conductor • 120-volt circuit • 240-volt circuit • Romex (NM cable) • Conduit • Wire gauge (AWG) • Ampacity • Splice • Wire connector • Terminal • Pigtail connection • Cable clamp • Junction box • Electrical box • Receptacle • Outlet • Switch • Single-pole switch • Three-way switch • Dimmer switch • Light fixture • LED (Light Emitting Diode) • GFCI (Ground Fault Circuit Interrupter) • National Electrical Code (NEC) • Code compliance • Lockout/Tagout • Overload • Short circuit • Arc fault • Ground fault • Multimeter

Activities, Instructional Strategies, and Assignments
• Project based and self-exploration activities • Real life digital design challenges, assessments, and projects • Teacher guided instruction • Lectures • Multiple Visual Examples • Question and Answer • Whole class reviews, check-ins, and student-led presentations • Independent, self-paced learning • Collaborative group (partner) design challenges • Do-nows • Exit Tickets

Accommodations and Modifications (BHPRSD Accommodations and Modifications)
● Provide a variety of concrete examples from familiar contexts ● Build background knowledge of content and vocabulary from familiar contexts prior to readings ● Use mental models to build understanding through familiar contexts ● Provide oral & written instructions ● Incorporate multimedia/audio visual representation (YouTube, Discovery Education, TV Show parodies, etc.) to build understanding ● Use graphic organizers to guide notes, brainstorming, pre-writing, project planning, and test preparation ● Model through processes during assignments and elicit student-generated thoughts to determine gaps in understanding ● Highlight, bold, or underline main ideas in readings and in directions for writing assignments in the curricular areas ● Provide guiding questions to complete during the activity ● Provide chunking of instructional notes and activities to allow for formative assessment (checks for understanding) before moving on to the next stage ● Choose cooperative learning groups to ensure effective work, maximize productivity and support socialization ● Use multiple intelligences or the student's learning style to facilitate effective learning when a student is having difficulty grasping concepts ● Provide demonstrations, utilize pictures, or graphic to assist visual learners to support written text information ● Include oral discussions, oral presentations, group collaboration, or other oral delivery methods to support auditory learners ● Provide chunking of assignments into manageable steps, including checklists that clarify directions for assignments ● Provide a clear, concise version of a scoring rubric prior to the assignment or assessment ● Highlight distinctive features/key concepts ● Provide choice of projects depending on the student’s interests or strengths. ● Review, repeat, and clarify directions ● Chunk sections of assessment ● Allow for partial credit, when appropriate

Formative Assessments

Students are expected to keep an organized Engineering Design Notebook, folder, or binder. Designs and projects that are done on the computer will be submitted to Google Classroom and are still considered to be part of the student's Engineering Design Notebook.
 	
1. Identifying the Problem
2. Research and Brainstorming
    a. "House Wiring Basics" - Individual Research Assignment
    b. "Wiring Simple Residential Circuits" - Google Classroom Assignment
        i. Open vs. Closed
        ii. Hot, Neutral and Ground
        iii. Series vs. Parallel and Open vs. Closed
    c. Schematic Designs Presentation w/ fill-in-the-blank notes
        i. "Create Your Own Schematic" - TinkerCAD
3. Hands-on AC Circuit Build, Test, and Analysis
    a. Resistance
    b. Voltage
    c. Current
    d. Ohm's Law
 	
Do-now's and checkpoint quizzes will be given during and at the conclusion of these topics

Summative Assessments
Final AC Circuit Schematic and Wired Circuit Evaluations End of Unit checks on Design Journals, documenting: ● Problem statement ● Criteria and constraints ● Design process ● Digital Design Development ● Testing, Modification, and Improvements made Final presentation or design review (partners/small group) Written reflection explaining design decisions (individual)

Unit Title:	Hydraulics and Fluid Power
Course:	Design & Technology III
Grade Levels:	11-12
Last Revision:	Summer 2026

Unit Overview
In this unit, students explore the principles of hydraulics and fluid power while applying the Engineering Design Process to solve real-world engineering challenges. Students investigate how hydraulic systems use fluid pressure to transmit force and motion, and how engineers incorporate these systems into machinery and equipment used in manufacturing, construction, transportation, and automation. Students apply these concepts by designing, modeling, fabricating, and assembling a custom hydraulic-powered project. Using CAD software, students create detailed digital models before manufacturing components with a variety of modern fabrication technologies, including 3D printers, laser engravers, CNC machines, and traditional shop tools and equipment.

Essential Questions	**Enduring Understandings**
How do engineers use the Engineering Design Process to develop hydraulic systems that solve real-world problems?	Engineers use the Engineering Design Process to design hydraulic systems by defining the problem, designing and fabricating components, assembling and testing the system, identifying leaks or performance issues, and refining the design until it functions safely and efficiently.
How do the individual components of a hydraulic system work together to perform useful work?	The individual components of a hydraulic system work together by allowing fluid pressure to transfer force from a pump or syringe through tubing to hydraulic cylinders or actuators, enabling the system to lift, push, pull, or move loads efficiently and in a controlled manner.
How do advanced manufacturing technologies such as 3D printing, laser cutting, and CNC machining improve the design and production of hydraulic devices?	Advanced manufacturing technologies such as 3D printing, laser cutting, and CNC machining improve the design and production of hydraulic devices by enabling engineers to rapidly prototype precise components, manufacture complex parts with high accuracy, test and refine designs efficiently, and produce reliable systems that meet performance, safety, and manufacturing requirements.
How do testing and redesign improve the performance and reliability of hydraulic systems?	Testing and redesign improve the performance and reliability of hydraulic systems by identifying leaks, weak components, and design flaws, allowing engineers to make modifications that increase strength, efficiency, precision, and overall system performance.

Learning Targets/Goals/Outcomes	Standards (NJSLS)
Read, interpret, and create technical drawings for the various parts and assemblies for the fluid power project.	8.2.12.ED.2 CTE - 9.3.12.AC.6
Identify and explain the function of major hydraulic components, including cylinders, pistons, reservoirs, tubing, valves, and actuators.	8.2.12.NT.1 CTE - 9.3.12.AC-CST.3
Create accurate 3D CAD models of hydraulic project components using engineering design software and safely operate 3D printers, laser engravers, CNC machines, and traditional shop equipment to fabricate project parts.	8.2.12.ED.5 8.2.12.ED.6
Develop multiple design solutions by studying existing, real-world applications, and justify the selection of the most effective design.	8.2.12.ED.2 8.2.12.ED.3
Evaluate how design modifications affect the performance, efficiency, and reliability of a hydraulic system and redesign, as necessary.	8.2.12.NT.2 CTE - 9.3.ST.2

Interdisciplinary Connections
Math (HSN-Q.A.1), Science (HS-ETS1-4)

21st Century Skills
In this unit, students continue to develop critical thinking skills, creativity, collaboration, communication, and problem-solving. Using the Engineering Design Process, students learn to analyze challenges, develop innovative solutions, create prototypes, and refine designs based on testing and feedback.

Writing Assignments
• Sketching Assignments • Reflection Assignments • Individual and/or group Presentations

Vocabulary - List Tier 2 (Academic Essentials)	Vocabulary - Tier 3 (Content-Specific)
• Component • System • Function • Process • Specifications • Input • Output	• Hydraulic system • Fluid power • Hydraulic pressure • Hydraulic cylinder • Hydraulic piston • Hydraulic actuator • Hydraulic ram • Reservoir • Hydraulic fluid • Incompressible fluid • Pascal's Law • Pressure • Force • Area

	• Mechanical advantage • Fluid transmission • Flow rate • Pressure differential • Closed Loop System • Open Loop System • Syringe • Tubing • Check valve • Directional control valve • Seal • O-ring • Fitting • Coupling • Plunger • Piston rod • Cylinder bore • Pump • Valve • Tolerance

Activities, Instructional Strategies, and Assignments
• Project based and self-exploration activities • Real life digital design challenges, assessments, and projects • Teacher guided instruction • Lectures • Multiple Visual Examples • Question and Answer • Whole class reviews, check-ins, and student-led presentations • Independent, self-paced learning • Collaborative group (partner) design challenges • Do-nows • Exit Tickets

Accommodations and Modifications (BHPRSD Accommodations and Modifications)
• Provide a variety of concrete examples from familiar contexts • Build background knowledge of content and vocabulary from familiar contexts prior to readings • Use mental models to build understanding through familiar contexts • Provide oral & written instructions • Incorporate multimedia/audio visual representation (YouTube, Discovery Education, TV Show parodies, etc.) to build understanding • Use graphic organizers to guide notes, brainstorming, pre-writing, project planning, and test preparation • Model through processes during assignments and elicit student-generated thoughts to determine gaps in understanding • Provide guiding questions to complete during the activity • Provide chunking of instructional notes and activities to allow for formative assessment (checks for understanding) before moving on to the next stage

- Choose cooperative learning groups to ensure effective work, maximize productivity and support socialization
- Use multiple intelligences or the student's learning style to facilitate effective learning when a student is having difficulty grasping concepts
- Provide demonstrations, utilize pictures, or graphic to assist visual learners to support written text information
- Include oral discussions, oral presentations, group collaboration, or other oral delivery methods to support auditory learners
- Provide chunking of assignments into manageable steps, including checklists that clarify directions for assignments
- Provide a clear, concise version of a scoring rubric prior to the assignment or assessment
- Highlight distinctive features/key concepts
- Provide choice of projects depending on the student's interests or strengths.
- Review, repeat, and clarify directions
- Chunk sections of assessment
- Allow for partial credit, when appropriate

Formative Assessments

Students are expected to keep an organized Engineering Design Notebook, folder, or binder. Designs and projects that are done on the computer will be submitted to Google Classroom and are still considered to be part of the student's Engineering Design Notebook.
 	
1. Identifying the Problem
2. Research and Brainstorming
    a. "Fluid Power Basics" - Individual Research Assignment
    b. "Fluid Power in Manufacturing" - Google Classroom Assignment
        i. Power and Pressure
        ii. Mechanical Advantage
        iii. Open vs. Closed Loop Systems
3. Digital Design 3D Model Parts
4. Hands-on Build, Test, and Analysis
 	
Do-now's and checkpoint quizzes will be given during and at the conclusion of these topics

Summative Assessments
Final Fluid Power Device Evaluations End of Unit checks on Design Journals, documenting: ● Problem statement ● Criteria and constraints ● Design process ● Digital Design Development ● Testing, Modification, and Improvements made Final presentation or design review (partners/small group) Written reflection explaining design decisions (individual)