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

Woodworking

COURSE OF STUDY

Technology Education Department

Written By:

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Date:

Fall 2023

Supervisor:

Steve Arena

Approved by:

Marcie Geyer, Director of Curriculum & Instruction

WOODWORKING

TRITON REGIONAL HIGH SCHOOL

Course Syllabus

Mr. O'Donnell

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Phone #

REMIND CODE

CLASS CODE

COMMON TIME AVAILABILITY

LETTER DAYS

COURSE DESCRIPTION

9-12 Graders

5 Credits

In Woodworking, you will learn about the nature and biology of wood as a construction material and renewable natural resource. You will work on hands-on projects, sometimes working individually and sometimes in a group, where you will learn to read and interpret a set of plans, then use a variety of hand and power tools safely to create your projects. Woodworking is a skill that you will continue to refine throughout the year.

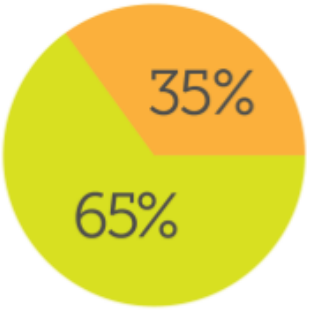
UNITS COVERED

- Wood Science and Processing
- Hand Tool Safety
- Small Power Tool Safety and Operation
- Large Machine Safety and OPeration
- Plan Reading and Sketching
- Wood Processing
- Joinery
- Hardware Identification and Application
- CNC Machining

MATERIALS NEEDED

- Pencil (bring everyday)
- Safety Glasses

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 (not each class, but each day) it is late, up to -50% (5 days late). Work can still be turned in after that, but will be -50%.
- Up to teacher discretion.

ATTENDANCE

- If you are absent, it is your responsibility to e-mail me and check Google Classroom.
- If you know you're going to be out, notify me ahead of time so I can help you
- You will get extensions on assignments equal to the number of days you were out (out sick 2 days = 2 day extension)
- 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 phone and headphones away while I am teaching
2. Keep quiet and pay attention during lectures, lessons and demonstrations
3. 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)
4. Each class we will have daily/weekly checkpoints. Make sure you know what they are and work to meet those checkpoints
5. When prompted to get to work, you should get to work within just a couple minutes. Any longer and you will lose participation points
6. 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
7. Use school appropriate language and be mindful of your classmates
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.

Woodworking

School Calendar

1. Wood Science and Wood Processing - 3 Weeks
2. Hand and Power Tool Safety and Uses - 3 Weeks
3. Machine Safety - 3 Weeks
4. Reading and Fabricating Wood to Woodworking Plans - 4 Weeks
5. Basic Joinery with a Multiple Part Project - 7 Weeks
6. Hardwoods and Advanced Joinery- 4 Weeks
7. CNC Machining - 3 weeks
8. The Woodworking Process - 5 Weeks

September '22

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October '22

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November '22

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December '22

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January '23

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February '23

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March '23

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April '23

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May '23

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June '23

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Unit Summaries

Woodworking

Course Content

1. **Wood Science and Wood Processing** - Students will start the year learning about the origin, types, characteristics, and internal structure of wood. Students will be introduced to concepts of conservation, dendrochronology, and the skills and opportunities related to the forestry field. Students will learn to identify multiple types of wood and manufactured wood products. Students will learn the steps of material processing from tree to finished project with hand tools. (Activity: Wooden Cookie Lanyard Project)

2. **Hand Tool Safety and Uses** - Students will learn to safely identify, handle, sharpen and use basic hand woodworking tools to process a board. Students will practice with the tools to master the handsaws, planes, rasps/files, chisels, mallets, and try squares while they make multiple types of wood shavings. Students will learn the steps to properly square up a board and attempt to square up a board using their hand tool skills. (Activity: Square Up a Board with Hand Tools)

3. **Machine Safety** - Students will learn the universal machine safety rules. Students will learn the specific safety rules and operating procedures of the bandsaws and power sanders. Students will be introduced to the drill press, planer, jointer, table saw, belt/disc sanders, and other machines, but the focus will primarily be on the bandsaw. Students will be responsible for setting up the bandsaw for a safe cut bandsaw and making multiple practice cuts on the saw. Students will then make two shapes on the bandsaw and sanders and may utilize the hand tools when applicable. (Activity : Bandsaw Bat, Bandsaw Shape)

4. **Reading and Fabricating Wood to Woodworking Plans** - Students will learn to read and interpret measurements from a set of detailed woodworking plans. Students will use these plans, along with layout tools, to accurately layout their parts on a piece of wood, which they will mill, square up, map and cut out themselves on the machines. Students will continue learning about machine safety and focus on milling machines in this unit, including the jointer, planer, table saw, and power miter saw. (Activity: Skills Block)

5. **Basic Joinery with a Multiple Part Project** - Students will learn to build a project with multiple parts. Students will be introduced to the full woodworking process, from rough wood to finished product. Students will begin by reading the set of plans, make a Bill of Materials and Order of Operations, then map out their parts on paper before milling and processing their pieces. Students will fabricate, assemble with hardware, sand and finish their project, taking it from rough stock to a fine, finished product. (Activity: Toolbox Project, Rabbet Joint Pencil Box)

6. **Hardwoods and Advanced Joinery** - Students will continue to expand their knowledge, operation and safety of the various machines, ultimately taking a project from an idea to a final, finished project. Students will be introduced to hardwoods, even more complex joinery techniques, and will refine their skills with all of the milling and joinery machines, including some new ones, like the handheld power router. (Hardwood Joiners Mallet or Handmade Woodworking Tool)

7. **CNC Machining** - Students will be introduced to the CNC machines and by the end of this unit, students will create a VCarve file, safely set up their stock on the CNC Machine, successfully process their design, and clean up and shut down the machine for future use. (Wooden Spoon, Laser Plaque)

8. **The Woodworking Process** - Students will work in groups to choose a woodworking project where they will have to work together to plan, mill, fabricate, assemble, finish multiple projects. This unit caps off the entire year and it is a chance for students to show their knowledge of project planning, time management, hand tool and machine safety and operation, and a way for them to showcase their skills with processing and finishing. (Yard/Table top Game Project)

Programs: Autodesk AutoCAD, Onshape, V-Carve, Shaper

Course Expectations and Skills

1. Come to class each day willing to participate, prepared to learn, and ready to succeed.
2. Phones and other electronic devices should be kept away the entire time.
3. Use your resources when you are stuck (class notes or handouts, posts on Google Classroom, ask a classmate, search for the solution online, etc.)
4. When prompted to get to work, do not wait. Get to work right away!
5. Engineering is a process. Project will often take weeks or months to complete. Understand that you might not have the answers today, but if you keep at it and persist through, you will succeed.
6. Strive for accuracy and focus on craftsmanship.
7. See each project through to the end. Incomplete work will not be accepted.
8. Share ideas, help build, and equally contribute to group-based projects.
9. Practice proper attitude and safe discipline at all times.
10. Ask questions and have fun!

Resources:

Wagner, W. H., & Kicklighter, C. E. (2006). “Modern Woodworking (11th Ed.). Goodheart-Willcox Co.

Unit 1:	Wood Science and Hand Tool Woodworking

Unit Summary
Students will start the year learning about the origin, types, characteristics, and internal structure of wood. Students will be introduced to concepts of conservation, dendrochronology, and the skills and opportunities related to the forestry field. Students will learn to identify multiple types of wood and manufactured wood products. Students will apply grain orientation in wood. Students will learn the steps of material processing from tree to finished project with hand tools.

Essential Questions
• Where does wood come from and how is it harvested and processed?
• How does the tree's growth structure affect its woodworking properties?
• What wood working operations are you currently performing to the tree/wood?

Enduring Understandings
• Wood comes from coniferous and deciduous trees that are in forests that are logged, harvested, dried,and milled into boards for use.
• Woods grain direction flows up and down the tree. Wood reacts very differently when cut along verses across this grain pattern.
• We process the wood using tools in a particular order of operations to make a desired product.

Behavioral Objectives/Learning Outcomes	**Standards (NJSLS)**
• Identify and compare softwoods and hardwoods and their sources in nature. • Identify defects in wood ○ Warps, knots, checks, metal • Recognize the interconnectivity and relationship between oneself to nature. • Identify and explore career paths in forestry related fields.	9.3.12.AG-NR.2 9.3.12.AG-PL.2
• Explain and Demonstrate grain orientation comprehension	9.3.MN.6

• Use tools to safely process a tree into a finished project
  ○ Japanese saw to crosscut
  ○ Sand through the grits 80-320
  ○ Layout, center punch, bore holes for cordage
  ○ Layout and wood burn name into cookie
  ○ Measure, cut, and assemble cordage
	9.3.12.AC-CST.9

Interdisciplinary Connections
Science - Dendrochronology, environmental studies and sustainability, physics in cutting edge geometry English - Identify, compare and contrast, explain

21st Century Skills
Communication skills, problem solving, perseverance, collaboration, information literacy, global awareness, self-direction, social skills, literacy skills, social responsibility, thinking skills

Writing Assignments
Order of Operations “Tree to Shop” Worksheet Wooden Cookie Reflection Slide

Activities, Instructional Strategies, and Assignments
Batoning Boards and Branches Activity Wooden Cookie Project

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
- 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
- Utilize hands-on activities, movement or rhythmic experiences to engage tactile/kinesthetic 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
- Provide peer assistance/study groups
- Review, repeat, and clarify directions
- Chunk sections of assessment

- Allow for partial credit, when appropriate
- Allow use of familiar contexts to demonstrate understanding of key concepts when use of text evidence is not necessary
- Provide general assistance with organizational skills
- Utilize homework assignment notebook/planner/agenda
- Provide written intermediate timelines for long assignments
- Have student monitor grade average
- Keep rules simple and clear
- Implement a behavior management system

Formative Assessments

- Checkpoints on student Order of Operations
- “Tree to Shop” Worksheet

Summative Assessments

- Wooden Cookie Name Tag Project

Performance Assessments

- Preparing for Class
- Batoning wood safely
- Cross cutting Wood safely

RETURN TO CALENDAR

RETURN TO UNIT SUMMARIES

Unit 2:	Hand Tool Safety and Uses

Unit Summary
Students will learn to safely identify, handle, sharpen and use basic hand woodworking tools to process a board. Students will practice with the tools to master the handsaws, planes, rasps/files, chisels, mallets, and try squares while they make multiple types of wood shavings. Students will learn the steps to properly square up a board and attempt to square up a board using their hand tool skills.

Essential Questions	**Enduring Understandings**
● What are the 4 Primary woodworking tools and what are they used for?	● The saw, plane, file and chisel can be used together to process wood into simple and complex shapes
● What order of operations must be followed to attain a square board?	● A board should be planed, jointed, ripped, then crosscut on its ends to attain a square board.
● How can safety be maintained while using sharp tools?	● One must consider many variables to maintain safe work operation including the person, wood, tool, workshop setting and careful, mindful focus always be maintained.

Behavioral Objectives/Learning Outcomes	**Standards (NJSLS)**
● Students will learn skills to utilize hand tools to process a board square, tools include: ○ Japanese ryoba saw, western crosscut saw, ○ block plane and bench plane ○ Rasp and file ○ Chisel and sharpening stone ○ try square.	9.3.12.AC-CST.9 9.3.MN-HSE.2
● Students will learn the order of operations to square a board ○ Try square use, face planing, edge planing, rip cutting, edge planing to a line, cross cutting, cross filing and draw filing.	9.3.12.AC-CST.9
● Students will demonstrate safe working practices while working in the shop and using tools.	9.3.MN-HSE.2 9.3.MN-MIR.2

Interdisciplinary Connections
Science - Physics Math - Geometry

21st Century Skills
Critical thinking, communication skills, creativity, problem solving, perseverance, collaboration, information literacy, technology skills and digital literacy, media literacy, global awareness, self-direction, social skills, literacy skills, civic literacy, social responsibility, innovations skills, thinking skills

Writing Assignments
Hand Tools and Uses Hand Tool Reflection Slide

Activities, Instructional Strategies, and Assignments
Chisels - Safe two handed paring and chopping Japanese saws - Crosscut and Ripcuts Coping saw - Cutting simple curves Planes - Edge planing, face planing, chamfering Files and Rasps-Shaping and End Grain filing Use a Try Square with hand tools to “Square a Board”

Accommodations and Modifications (BHPRSD Accommodations and Modifications)

- Provide a variety of concrete examples from familiar contexts
- Provide study guides and support outside of class time to review before assessments (common time or after school)
- Build background knowledge of content and vocabulary from familiar contexts prior to readings
- Use mental models to building 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
- Utilize hands-on activities, movement or rhythmic experiences to engage tactile/kinesthetic 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
- Provide peer assistance/study groups
- Review, repeat, and clarify directions
- Chunk sections of assessment
- Allow for partial credit, when appropriate
- Allow use of familiar contexts to demonstrate understanding of key concepts when use of text evidence is not necessary
- Provide general assistance with organizational skills
- Utilize homework assignment notebook/planner/agenda
- Provide written intermediate timelines for long assignments
- Have student monitor grade average
- Keep rules simple and clear
- Implement a behavior management system

Formative Assessments

- Notes on Hand Tools
- Hand Tool Reflection Slide

Summative Assessments

- Wood Shavings with Hand Tools

Performance Assessments

- Safety Checkpoints with each tool

RETURN TO CALENDAR

RETURN TO UNIT SUMMARIES

Unit 3:	Machine Safety

Unit Summary
Students will learn the universal machine safety rules. Students will learn the specific safety rules and operating procedures of the bandsaws and power sanders. Students will be introduced to the drill press, planer, jointer, table saw, belt/disc sanders, and other machines, but the focus will primarily be on the bandsaw. Students will be responsible for setting up the bandsaw for a safe cut bandsaw and making multiple practice cuts on the saw. Students will then make two shapes on the bandsaw and sanders and may utilize the hand tools when applicable.

Essential Questions	**Enduring Understandings**
• What are the General Shop Safety Rules you must always follow? • Why do you need to always wear safety glasses? • Why is it important to keep the classroom and the machines clean? • What if a machine is not cutting/drilling or it is making a strange noise?	• Shop maturity, attitude, and focus.are the foundation of safety in a shop. A few important rules are to have proper clothing, proper PPE, instructor is present, only using tools you have been cleared to use for specific operations. • A well organized and clean shop produces a safer environment. • Report all incidents and safety relevant information to the instructor immediately before proceeding to work.
• How do you safely operate the band saw? • How do you adjust the guards on the bandsaw? • How do you safely operate the power sander?	• The bandsaw must be set up with guards ¼ inch above the stock while it is not running. • Curved and straight cuts are made slowly, keeping fingers clear of the blade and its path, not forcing the turn or speed of the saw. Push sticks may be used to keep fingers clear on small cuts.
• When would you use a band saw vs. a power sander?	• Bands saw is used first to cut on the waste of the line by about an ⅛ of an inch, then the power sander can be used to sand up to the line and smooth out the saw marks.
• When planning cuts, how do you accurately measure and mark for a cut?	• Measure Twice, then mark one clean line with a square. Place an X on the waste side to ensure the blade cut is on the waste side.

Behavioral Objectives/Learning Outcomes	**Standards (NJSLS)**
• Identify Parts of the saw and • Safely adjust the height of the guard	9.3.MN-HSE.1
• Layout and cut on the waste side of both a crosscut, rip cut and a curve adhering the machine safety procedures	9.3.MN.6
• Trace the bat onto ¼ inch Ply	9.3.MN-HSE.1

• Layout and number the planned cuts • Cut out the bat profile on the bandsaw and sanders adhering to the machine safety procedures • File and sand the bat smooth • Paint the bat to a finished product • Trace and plan cuts of another object/shape on the pine/ poplar • Cut out shape on the bandsaw and sanders • Sand the object smooth • Apply a clear coat finish or paint the object.	9.3.MN.6 9.3.MN-QA.1

Interdisciplinary Connections

STEAM, English, Geometry

21st Century Skills

Critical thinking, communication skills, creativity, problem solving, perseverance, collaboration, information literacy, technology skills and digital literacy, self-direction, social skills, literacy skills, innovations skills, thinking skills

Writing Assignments

Students are encouraged to take written notes when taught safety on each machine. Safety Study Guides will be provided for each machine, but students should be filling out any missing information. Students will be taking written Safety Quizzes and must pass with a certain grade. Students who do not pass must review the content with the teacher and retake the safety quizzes before continuing work in the woodworking classroom.

Activities, Instructional Strategies, and Assignments

This unit is one of the most important because the content students learn here will carry through the rest of this course and through Advanced Woodworking too. This is where students will learn how to safely operate some of the machines in the woodworking classroom. In this unit, students will take a deep dive into the band saw and the power sanders.

1. The teacher will demonstrate how to safely use each machine.
    a. Students are required to identify and describe the most important parts of each machine.
    b. Students must know how to turn the machine on and off, adjust guards before making a cut, successfully make a cut, lower guards, and clean the machine for the next student.
2. After each demonstration, students will be given study guides that will have various parts labeled and a written checklist for how to safely operate each machine. Safety videos of the teacher's demonstration and additional support materials will be posted to Google Classroom.
3. Students will take Safety Quizzes on each machine and must pass with a certain grade. Students who do not pass must review the content with the teacher and retake the safety quizzes before continuing work in the woodworking classroom.
4. Once students pass the written safety quiz for a machine, they are cleared to use that machine. Students will be assessed on their ability to safely use these machines.

After learning the safety on these machines, students will make a Plywood Halloween Bat and a Custom Shape Pine Project. These projects are designed to ease students into Woodworking, get them using the

tools and machines, getting familiar with how they work, feel, and sound. The goal is to build student confidence and make sure that students are using these machines safely and that they are comfortable. An emphasis is placed on accuracy of cuts, but as the year progresses, projects get more complex, and students use these machines more and more, the quality of their work should improve drastically.

Accommodations and Modifications (BHPRSD Accommodations and Modifications)

- Provide study guides and support outside of class time to review before assessments (common time or after school)
- 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
- 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
- Utilize hands-on activities, movement or rhythmic experiences to engage tactile/kinesthetic 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
- Provide peer assistance/study groups
- Review, repeat, and clarify directions
- Chunk sections of assessment
- Provide general assistance with organizational skills
- Provide written intermediate timelines for long assignments
- Have student monitor grade average
- Keep rules simple and clear

Formative Assessments

- Band Saw Written Safety Quiz and Hands-on Quiz
- Power Sander Written Safety Quiz and Hands-on Quiz

Summative Assessments
● Hands-on Safety: ○ Plywood Halloween Bat Project ○ Custom Shape Pine Project

Performance Assessments
● Safely utilize all tools and machines

RETURN TO CALENDAR

RETURN TO UNIT SUMMARIES

Unit 4:	Reading and Fabricating Wood to Woodworking Plans

Unit Summary
Students will learn to read and interpret measurements from a set of detailed woodworking plans. Students will use these plans, along with layout tools, to accurately layout their parts on a piece of wood, which they will mill, square up, map and cut out themselves on the machines. Students will continue learning about machine safety and focus on milling machines in this unit, including the jointer, planer, table saw, and power miter saw.

Essential Questions	**Enduring Understandings**
• Why do we measure to 1/16”? • How do you move back and forth between fractions and decimals?	• Measuring to a 16th of an inch is common practice in woodworking. Tape measures usually are marked in 1/16th of an inch increments.
• What is an orthographic view? • Why is it important to have the top, front and side views of parts? • What is an isometric view? • How can detailed views help with understanding a part? • How are woodworking drawings different and how are they similar to other drawings?	• An orthographic three view drawing which shows front, top and right side views is usually necessary to show all of the dimensions and features of a project. • Isometric drawings give a lifelike three dimensional view of the object. • Detail views and sectional views can be used to gain new vantage points to show details, and also to enlarge small details.
• What are the steps you take when squaring up a board? • How do you use a square?	• There is a specific process used to attain a square board. We must machine all the surfaces in a specific order which utilizes reference surfaces. We must plane, joint, rip and then crosscut the board. • The try square is used to check surfaces for flatness and angles for squares.
• How do you safely operate the jointer? • How do most injuries occur on the jointer?	• Jointer takes small shavings with the grain from the bottom edge of the board that must be 10” in length. One slides the piece of wood on edge from the infeed to the outfeed table while keeping fingers 4” clear of the blade. • Main Safety Considerations - Clothing, finger placement, length and grain orientation, take multiple thin passes, correct feed direction and speed.
• How do you safely operate the planer? • When using the planer, how much material should you take off with each pass?	• Wood is fed flat, with the grain, into the rollers and cutterhead on the infeed table. Wood is kept stable while clothing and hands are kept clear of the planer. Do not stand in the kickback zone. • Only take passes up to 1/16 of an inch in depth. Do not plane smaller than ¼ inch,thick and 1 foot long stock.
• How do you safely operate the table saw?	• Stock is rip cut, crosscut and joints milled with a table saw and accessory. Hands kept 4 inches from the blade.

• What is kickback? • What is the difference between the fence and the miter gauge?	• While ripping the wood must stay tight to the fence to prevent wood kickback, • Use a fence to rip cut or a miter gauge to crosscut
• How do you safely operate the power miter saw? • How do you prevent your piece of wood from kicking?	• A conventional cut is made front to back of the saw. Saws are brought to full speed and a slow steady crosscut is made.The wood must be 12 inches long and properly fit in the saw being used. Fingers are kept 4-8 inches away from the blade. • To prevent kickbacks: No rip cuts, and no small pieces. Securely hold the wood flat and joint edge tight to the fence with adequate pressure. A clamp may be occasionally needed to keep a board stable.

Behavioral Objectives/Learning Outcomes	**Standards (NJSLS)**
• Students will measure accurately to within 1/16 of an inch	9.3.ST.1
• Students will interpret the orthographic drawings. • Students will use measurements to transfer the drawings information into a clean accurate layout on the wood.	9.3.12.AC-DES.6
• Students will recall the safety rules of the milling machinery including table saw, power miter saw, jointer, and planer. • Students will properly operate the machinery following all safe operating procedures. • Students will fabricate a “skills block” to a specific set of plans to enhance mastery of the machine procedures.	9.3.12.AC-CST.5 9.3.MN-QA.5

Interdisciplinary Connections
STEAM, English, Geometry

21st Century Skills
Critical thinking, communication skills, creativity, problem solving, perseverance, collaboration, information literacy, technology skills, self-direction, social skills, literacy skills, innovations skills, thinking skills

Writing Assignments

Students will be given notes and worksheets that teach measurement tools and techniques.

Students will be given notes and worksheets that teach students how to read and interpret woodworking drawings.

Students are encouraged to take written notes when taught safety on each machine. Safety Study Guides will be provided for each machine, but students should be filling out any missing information. Students will be taking written Safety Quizzes and must pass with a certain grade. Students who do not pass must review the content with the teacher and retake the safety quizzes before continuing work in the woodworking classroom.

Activities, Instructional Strategies, and Assignments

Students will take a deep dive into measurement and woodworking drawings. Students are expected to follow along with notes and handouts provided. This will serve as the basis for all the projects that are to follow in Woodworking and Advanced Woodworking.

This unit is one of the most important because the content students learn here will carry through the rest of this course and through Advanced Woodworking too. This is where students will learn how to safely operate some of the machines in the woodworking classroom. In this unit, students will take a deep dive into the jointer, planer, power miter saw, and the table saw.

1. The teacher will demonstrate how to safely use each machine.
    a. Students are required to identify and describe the most important parts of each machine.
    b. Students must know how to turn the machine on and off, adjust guards before making a cut, successfully make a cut, lower guards, and clean the machine for the next student.
2. After each demonstration, students will be given study guides that will have various parts labeled and a written checklist for how to safely operate each machine. Safety videos of the teacher's demonstration and additional support materials will be posted to Google Classroom.
3. Students will take Safety Quizzes on each machine and must pass with a certain grade. Students who do not pass must review the content with the teacher and retake the safety quizzes before continuing work in the woodworking classroom.
4. Once students pass the written safety quiz for a machine, they are cleared to use that machine. Students will be assessed on their ability to safely use these machines.

After learning the safety on these machines, students will process rough lumber to a final, milled and squared block. This project is designed to give students experience on the machines covered in this unit, but also to show them how to turn rough lumber into a usable piece. The goal is to build student confidence and make sure that students are using these machines safely and that they are comfortable.

Accommodations and Modifications (BHPRSD Accommodations and Modifications)

- Provide study guides and support outside of class time to review before assessments (common time or after school)
- 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
- 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
- Utilize hands-on activities, movement or rhythmic experiences to engage tactile/kinesthetic 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
- Provide peer assistance/study groups
- Review, repeat, and clarify directions
- Chunk sections of assessment
- Provide general assistance with organizational skills
- Provide written intermediate timelines for long assignments
- Have student monitor grade average
- Keep rules simple and clear

Formative Assessments

- Jointer Written Safety Quiz and Hands-on Quiz
- Planer Written Safety Quiz and Hands-on Quiz
- Table Written Safety Quiz and Hands-on Quiz
- Practice Piece: Square and Mill a piece of wood

Summative Assessments

- Hands-on Safety:
  - Skills Block Project

Performance Assessments

- Safely utilize all tools and machines

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Unit 5:	Basic Joinery and Building a Multiple Part Project

Unit Summary
Students will learn to build a project with multiple parts. Students will be introduced to the full woodworking process, from rough wood to finished product. Students will begin by reading the set of plans, make a Bill of Materials and Order of Operations, then map out their parts on paper before milling and processing their pieces. Students will fabricate, assemble with hardware, sand and finish their project, taking it from rough stock to a fine, finished product.

Essential Questions	Enduring Understandings
• How does one organize the steps and plan of the woodworking process?	• The wood working process consists of: ○ Research and development, reading and making plans,, milling, fabrication, assembly, finishing.
• What 3 documents make up a set of plans?	• A sufficient set of mechanical drawings • A Bill of Materials • Order of Operations
• Why is a bill of materials important? • What is an order of operations? • What are the considerations in creating the order of operations?	• A bill of materials is the cut list of the final dimensions of the rectangular stock in the project. This is referred to while milling the stock square to dimension. It can be used to calculate wood volume and material cost. • An order of operations is a detailed list of operations and cuts to perform. • We prioritize Safety, then Accuracy, then Efficiency.when creating an order of operations.
• How can we safely, accurately, and efficiently mill the wood into the dimensioned parts? • How can we accurately create the layout on the wood? • What special operations must be performed to accurately fabricate the piece?	• With total focus and organization we can efficiently take turns milling boards to size. • Precise measurements and layout lines are diligently and carefully drawn using layout tools. • Machine the joinery, curves and more complicated cuts within the parts of the project.
• How will we connect the wooden parts together? • How do we prepare for assembly? • What methods can be used to assemble furniture and wood?	• The Assembly process is used to connect together wooden parts into a project. • We prepare for assembly by doing dry assembly, and gathering and organizing clamps and gluing materials. • The three methods of assembling wood include joinery, glue, and fasteners.

• How do we prepare the wood for finishing? • What are pros and cons of common finishes? • What are the safety concerns with different finishes? • What is a common finishing process?	• We sand with the grain. Sanding the piece 3 times:rough 100, medium150 and smooth 220 grit. We dampen and raise the grain between sanding grits. • There are many finishes and the best finish must be chosen based on intended use, desired look, and specific application. • Different finishes have specific safety protocols. Clean up, fumes, fire, hazardous waste, solvents, skin irritants, carcinogenic materials that may need to be considered. • We commonly apply a thinned sealer coat of finish. Then brush a few heavier coats. Once dry the finish is lightly sanded smooth with 320 and steel wool. Thinned down final coats are wiped on. It is smoothed with fine steel wool and then waxed with furniture wax.
• How can we reflect and learn from our experience? • What does the overall woodworking process involve?	• We must learn from our experiences • In woodworking we always follow the woodworking process: Plan, mill, fabricate, assemble, finish.

Behavioral Objectives/Learning Outcomes	**Standards (NJSLS)**
• Students will interpret the plans and draw a right view of the box. • Students will interpret the plans and create a “Bill of Materials” • Students will interpret the plans and create a “Order of Operations”	9.3.ST-ET.4
• Students will mill the rough lumber into final dimensioned stock • Students will draw layout of the joinery and shapes • Students will fabricate the dimensioned parts into final shape with special operations. • Students will assemble the parts into the project. • Students will finish the box following finishing procedures.	9.3.12.AC-DES.6 9.3.12.AC-CST.5

Interdisciplinary Connections
Math, Engineering, science. vocational

21st Century Skills
Critical thinking, communication skills, creativity, problem solving, perseverance, collaboration, information literacy, technology skills and digital literacy, media literacy, global awareness, self-direction, social skills, literacy skills, civic literacy, social responsibility, innovations skills, thinking skills

Writing Assignments
Reflection Slide

Activities, Instructional Strategies, and Assignments
Orthographic Drawing of Right View Bill of Materials Order of Operations Building a Tool Box Project Toolbox Reflection Slide Making Plans for Rabbet Joint Box Building a Rabbet Joint Box Rabbet Joint Box Reflection Slide

Accommodations and Modifications (BHPRSD Accommodations and Modifications)

- Provide a variety of concrete examples from familiar contexts
- Provide study guides and support outside of class time to review before assessments (common time or after school)
- Build background knowledge of content and vocabulary from familiar contexts prior to readings
- Use mental models to building 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
- Utilize hands-on activities, movement or rhythmic experiences to engage tactile/kinesthetic 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
- Provide peer assistance/study groups
- Review, repeat, and clarify directions
- Chunk sections of assessment
- Allow for partial credit, when appropriate
- Allow use of familiar contexts to demonstrate understanding of key concepts when use of text evidence is not necessary
- Provide general assistance with organizational skills
- Utilize homework assignment notebook/planner/agenda
- Provide written intermediate timelines for long assignments
- Have student monitor grade average
- Keep rules simple and clear
- Implement a behavior management system

Formative Assessments

- Bill of Materials,
- Order of Operations
- Milling Checkpoint
- Layout Checkpoint
- Fabrication Checkpoint
- Assembly Checkpoint
- Finish Checkpoint

Summative Assessments

- Tool Box Project
- Rabbet Joint Box Project

Performance Assessments

- Safely utilize all tools and machines

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Unit 6:	Hardwoods and Advanced Joinery

Unit Summary
Students will continue to expand their knowledge, operation and safety of the various machines, ultimately taking a project from an idea to a final, finished project. Students will be introduced to hardwoods, even more complex joinery techniques, and will refine their skills with all of the milling and joinery machines, including some new ones, like the handheld power router.

Essential Questions	**Enduring Understandings**
• What are the steps in the woodworking process? • How do we add joinery into the planning process?	• Planning, milling, fabricating, assembly and finishing are the general steps of the wood working process. • We study auxiliary drawings of joints and then write the cuts into the “order of operations” during the fabrication stage of the project. .
• During the fabrication process, What machines and tools are commonly utilized to cut joinery?	• Routers, tables saws, dado blades, power miter saws, drill presses, fine backsaws, planes, and chisels are commonly utilized in cutting joinery.
• How do we accommodate the woodworking process for hardwood stock?	• We must slow down the feed rate of hardwood stock into machines. We must take thinner passes with routers, planers and jointers.

Behavioral Objectives/Learning Outcomes	**Standards (NJSLS)**
• Draw an orthographic drawing of the Mallet or advanced joinery project	9.3.ST-ET.2
• Create a Bill of Materials from the orthographic drawing,	9.3.ST-ET.2
• Create an Order of Operations	9.3.ST-ET.2
• Utilize milling machines to safely the wood into dimensioned stock	9.3.12.AC-CST.5
• Accurately layout and cut joinery utilizing joinery techniques and procedures.	9.3.ST.6
• Assemble the wooden mallet or advanced joinery project	9.3.ST.6
• Apply the wood finishing process to the mallet or project	9.3.ST.6
• Reflect upon the experience and woodworking process.	9.3.ST-SM.3

Interdisciplinary Connections
Math, Science, Manufacturing, Vocational

21st Century Skills
Critical thinking, communication skills, creativity, problem solving, perseverance, collaboration, information literacy, technology skills and digital literacy, media literacy, global awareness, self-direction, social skills, literacy skills, civic literacy, social responsibility, innovations skills, thinking skills

Writing Assignments
Project Reflection

Activities, Instructional Strategies, and Assignments
Orthographic Drawing Bill Of Materials Order of Operations Mill dimensioned lumber checkpoint Layout Checkpoint Fabrication Checkpoint Router manipulative and Written Quiz Assembly Checkpoint Finishing Checkpoint Reflection Activity and Slide

Accommodations and Modifications (BHPRSD Accommodations and Modifications)

- Provide a variety of concrete examples from familiar contexts
- Provide study guides and support outside of class time to review before assessments (common time or after school)
- Build background knowledge of content and vocabulary from familiar contexts prior to readings
- Use mental models to building 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
- Utilize hands-on activities, movement or rhythmic experiences to engage tactile/kinesthetic 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
- Provide peer assistance/study groups
- Review, repeat, and clarify directions
- Chunk sections of assessment
- Allow for partial credit, when appropriate
- Allow use of familiar contexts to demonstrate understanding of key concepts when use of text evidence is not necessary
- Provide general assistance with organizational skills
- Utilize homework assignment notebook/planner/agenda
- Provide written intermediate timelines for long assignments
- Have student monitor grade average
- Keep rules simple and clear
- Implement a behavior management system

Formative Assessments

- Written Router Quiz
- Orthographic drawing
- Bill of Materials
- Order of Operations

Summative Assessments

- Rabbet Joint Sliding Box Project
- Hardwood Mallet

Performance Assessments

- Safe operation of milling and fabrication machines.
- Efficient operating procedures of assembly process
- Diligent perform Finishing process

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Unit 7:	CNC Machining

Unit Summary
Students will be introduced to the CNC machines and by the end of this unit, students will create a VCarve file, safely set up their stock on the CNC Machine, successfully process their design, and clean up and shut down the machine for future use. Students will use the CNC machine for project fabrication.

Essential Questions	**Enduring Understandings**
• How has the CNC Machine changed the manufacturing process? • Compare and contrast how a CNC Machine impacts the design process vs. using hand tools.	• CNC stands for computer numerical control and these machines play an important role in the manufacturing industry. These complex machines are controlled by a computer and provide a level of efficiency, accuracy and consistency that would be impossible to achieve through a manual process. • As a result, manufacturers can produce parts in less time, reduce waste and eliminate the risk of human error. • Only highly skilled and educated people can operate CNC Machines because of their complexity.
• How do you set up, run, break down, and maintain the CNC Machine? • What is the difference between an upcut and downcut bit? • What are some safety rules and considerations you must follow when using the CNC Machine?	• As with other machines in the Woodworking Classroom, the CNC Machine requires knowledge, skill, and some common sense to operate. The tools must be set up the correct way to ensure they run safely and that no damage or injury comes to the machine or the operator. • The CNC Machine operator has to be smarter than the tool. They have to keep an eye out for things that could potentially go awry, especially when plunging down into a material to cut.

Behavioral Objectives/Learning Outcomes	**Standards (NJSLS)**
• Consider how the CNC Machine has changed the manufacturing process. • Describe career opportunities and means to achieve those opportunities related to CNC Machining.	9.3.MN.1 9.3.MN.4
• Identify the parts of the CNC Machine • Correctly prepare the VCarve file • Set up the tooling, clamps, and work piece • Successfully run the VCarve file and produce a final piece • Clean up the machine, run routine maintenance and follow all safety rules while using the CNC Machine	9.3.12.AC-CST.9 9.3.MN-HSE.1 9.3.MN-HSE.3

Interdisciplinary Connections
English - Research a CNC Machining-related career and prepare a presentation on that career

21st Century Skills
Critical thinking, communication skills, creativity, problem solving, perseverance, collaboration, information literacy, technology skills and digital literacy, media literacy, global awareness, self-direction, social skills, literacy skills, civic literacy, social responsibility, innovations skills, thinking skills

Writing Assignments
CNC Machinist - Career Investigation Activity

Activities, Instructional Strategies, and Assignments
Students will ensure that their VCarve file is set up correctly, with the appropriate tooling settings. The CNC Machine requires student's full attention and students will be setting up the CNC Machine, including clamping down their work piece, running the machine and cleaning-up. Since there is only one machine, students who are waiting to use the CNC Machine will be researching the history of the CNC Machine, its impacts on the manufacturing process, and potential careers related to CNC Machining.

Accommodations and Modifications (BHPRSD Accommodations and Modifications)

- Provide a variety of concrete examples from familiar contexts
- Provide study guides and support outside of class time to review before assessments (common time or after school)
- Build background knowledge of content and vocabulary from familiar contexts prior to readings
- Use mental models to building 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

- Utilize hands-on activities, movement or rhythmic experiences to engage tactile/kinesthetic 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
- Provide peer assistance/study groups
- Review, repeat, and clarify directions
- Chunk sections of assessment
- Allow for partial credit, when appropriate
- Allow use of familiar contexts to demonstrate understanding of key concepts when use of text evidence is not necessary
- Provide general assistance with organizational skills
- Utilize homework assignment notebook/planner/agenda
- Provide written intermediate timelines for long assignments
- Have student monitor grade average
- Keep rules simple and clear
- Implement a behavior management system

Formative Assessments

- Creating the VCarve file with correct settings
- Clamping and Tool Preparation Checklist

Summative Assessments

- CNC Wooden Spoon, Laser Engraved Plaque

Performance Assessments

- Safety checkpoints on the CNC Machine
- Safe operation of the CNC Machine, including set up, running, break down and clean up

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Unit 8:	The Woodworking Process

Unit Summary
Students will work in groups to choose a woodworking project where they will have to work together to plan, mill, fabricate, assemble, finish multiple projects. This unit caps off the entire year and it is a chance for students to show their knowledge of project planning, time management, hand tool and machine safety and operation, and a way for them to showcase their skills with processing and finishing.

Essential Questions	**Enduring Understandings**
• What type of information can we reveal about a potential project through research?	• Many features and options of a project can be revealed through research. We must research the overall project idea, materials needed, the joinery possibilities, size and dimension options, strength requirements, finish requirements.
• How can we integrate this research into our planning process?	• We will utilize the information we have collected to make the 3 project planning documents, Drawing, BOM, and Order of Operations.
• What project specific considerations must be recognized while making your plans?	• Each project has a unique and specific set of considerations including intended use, material, safety, size, and how many are being produced.
• What is the order of machine operations in squaring and dimensioning the stock? • What special fabrication operations must be used to fabricate the complex shapes and joinery? • How will project features affect the assembly and finishing process?	• Rough crosscut, joint edge, rip cut, cross cut the end to properly square a board.. • ;Layout and jig and fixture machine set ups are critical to fabricating complex joinery and shapes. • Size, shape, type of material, intended use, time constraints all determine the assembly and finishing details chosen.

Behavioral Objectives/Learning Outcomes	**Standards (NJSLS)**
• Utilize the research and design process to select a project • Research various important elements and options of the project • Create a overall rough plan for the project • Create a mechanical drawings • Create a Bill of Materials • Create an “Order of Operations”	9.3.ST-ET.2
• Safely operate machinery to mill square dimensioned parts • Layout and fabricate the joinery and shapes of the project • Assemble and Finish the Project	9.3.12.AC-CST.5

Interdisciplinary Connections
Math, Science, Engineering, Vocational

21st Century Skills
Critical thinking, communication skills, creativity, problem solving, perseverance, collaboration, information literacy, technology skills and digital literacy, media literacy, global awareness, self-direction, social skills, literacy skills, civic literacy, social responsibility, innovations skills, thinking skills

Writing Assignments
“Project idea” presentation outline Order of Operations Project Reflection

Activities, Instructional Strategies, and Assignments
Research presentation Rough Plan Mechanical Drawings Bill of Materials Order of Operations Project Reflection

Accommodations and Modifications (BHPRSD Accommodations and Modifications)

- Provide a variety of concrete examples from familiar contexts
- Provide study guides and support outside of class time to review before assessments (common time or after school)
- Build background knowledge of content and vocabulary from familiar contexts prior to readings
- Use mental models to building understanding through familiar contexts
- Provide oral & written instructions
- Incorporate multimedia/audio visual representation (YouTube, Discovery Education, TV Show parodies, etc.) to build understanding
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- 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
- Utilize hands-on activities, movement or rhythmic experiences to engage tactile/kinesthetic 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
- Provide peer assistance/study groups

- Review, repeat, and clarify directions
- Chunk sections of assessment
- Allow for partial credit, when appropriate
- Allow use of familiar contexts to demonstrate understanding of key concepts when use of text evidence is not necessary

- Provide general assistance with organizational skills
- Utilize homework assignment notebook/planner/agenda
- Provide written intermediate timelines for long assignments
- Have student monitor grade average
- Keep rules simple and clear

Formative Assessments

- Research Project
- Rough Plan
- Mechanical Drawing
- Bill of materials
- Order Of Operations

Summative Assessments

- Choice Project (Yard Games or Tabletop Games)
- Project Reflection Slide

Performance Assessments

- Safe Machining Fabrication Checkpoint
- Assembly Checkpoint
- Finishing Checkpoint

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