

**SHORE REGIONAL HIGH SCHOOL DISTRICT**

**A Regional Collaborative of the Communities Served by the Monmouth Beach, Oceanport, Shore Regional, and West Long Branch School Districts**

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Aligned to the New Jersey Student Learning Standards as Applicable

**Course Title:** Materials Processing Lab

**Content Area:** Technology/Industrial Arts

**Grade Level(s):** 9-12

**Course Description:** This is an advanced half-year, 2.5-credit course designed for students who may be considering postsecondary training in the areas of materials design, woodworking, construction, and machine safety. The prerequisite course is Materials Processing. The course will introduce more advanced hands-on techniques specific to construction methods, materials, and safety regulations. All skills and techniques acquired are considered to be fundamental for students pursuing advanced materials processing coursework. The focus will be on 21st century workforce skills in the areas of presentation, communication, mathematics, science, leadership, collaboration, and problem solving.

**Curriculum Writer(s):** Gregg Malfa

**Date Created:** July 2019

**Date Approved by Board of Education:** November 2019

**Pacing Guide**

Unit 1: Machine and Hand Tools Safety	4 Weeks	
Unit 2: Planning	3 Weeks	
Unit 3: Materials	3 Weeks	
Unit 4: Cutting/Assembly	3 Weeks	
Unit 5: Joinery/Fasteners	3 Weeks	
Unit 6: Finishing	3 Weeks	

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**Unit 1: Machine and Hand Tools Safety**

**Unit Summary:** Following safety procedures and using personal protective equipment (PPE) will reduce the risk of injury. Students will be able to identify and adhere to proper machine and hand tool safety in the work environment, inclusive of working as a team.

**Interdisciplinary Connections/Content Area Integrations Including Technology:**

- **Mathematics:** measuring
- **Science:** planning procedures
- **Technology:** use of machines and computers to generate plans and procedures

NJSLS Number	NJSLS Content
9.3.12.AC.6	Read, interpret, and use technical drawings, documents, and specifications to plan a project.
9.3.12.AC-CST.9	Safely use and maintain appropriate tools, machinery, equipment, and resources to accomplish construction project goals.
9.3.12.ED-TT.9	Utilize assessment and evaluation tools and data to advance learner achievement and adjust instructional plans.
9.3.MN-PRO.2	Manage safe and healthy production working conditions and environmental risks.
9.3.MN-PRO.4	Coordinate work teams when producing products to enhance production process and performance.

**Summative Assessments:**

- Safety Test

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- Portfolios, Self and Peer Assessment
- Performance Assessment
- Midterm/Final Exam
- Projects
- Rubric Assessment

### **Formative Assessments:**

- Observations (Peer and Teacher)
- Participatory Rubrics
- Projects
- Research Assignments

### **Enduring Understandings:**

- Following safety procedures and using personal protection equipment (PPE) will reduce the risk of injury.
- Tools and machinery have specific functions and methods for usage.

### **Essential Questions:**

- What are the safety concerns to be considered when working in a lab setting in school or on the job?
- What protection can be used in a laboratory environment?
- What should be part of an effective safety program?
- What characteristics are essential to a functional team?
- What are the benefits of working in a team environment as opposed to individually?
- What hand tools and machines are used for cutting?

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- What hand tools and machines are used for drilling and boring?
- What hand tools and machines are used for planing and jointing?
- What hand tools and machines are used for measuring and drawing?
- What hand tools and machines are used for sanding?

### Instructional Outcomes:

- Students will be able to identify and implement proper safety in a work environment, inclusive of working as a team.
- Students will be able to properly select and utilize the appropriate hand tools for the necessary task.
- Students will be able to properly select and safely utilize the appropriate portable power tool or machine for the task at hand.

### Suggested Learning Activities:

- Demonstrate safety proficiency as evidenced by the refresher safety test.
- Demonstrate use of various power tools that cut, drill, bore, route, shape, plane, joint, and sand.

### Suggested Differentiation:

- **Tier 1 Learners:** students provided one-to-one direct instruction, additional time, and auditory and visual supports
- **Tier 2 Learners:** students assigned to work with a partner or independently
- **Tier 3 Learners:** students assigned to work independently

### Curriculum Development Resources:

- [https://www.frhsd.com/cms/lib/NJ01912687/Centricity/Domain/19/Intro\\_to\\_Wood.pdf](https://www.frhsd.com/cms/lib/NJ01912687/Centricity/Domain/19/Intro_to_Wood.pdf)

### Notes/Comments:

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**Unit 2: Planning**

**Unit Summary:** Planning is an essential component to design, construction, material usage, and efficiency.

**Interdisciplinary Connections/Content Area Integrations Including Technology:**

- **Mathematics:** measuring
- **Science:** planning procedures
- **Technology:** use of machines and computers to generate plans and procedures

NJSLS Number	NJSLS Content
8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
8.2.12.A.1	Propose an innovation to meet future demands supported by an analysis of the potential full costs, benefits, tradeoffs, and risks related to the use of the innovation.
8.2.12.B.1	Research and analyze the impact of the design constraints (specifications and limits) for a product or technology driven by a cultural, social, economic, or political need and publish for review.
8.2.12.B.2	Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation, and maintenance of a chosen product.
8.2.12.B.3	Analyze ethical and unethical practices around intellectual property rights as influenced by human wants and/or needs.

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8.2.12.C.2	Analyze a product and how it has changed or might change over time to meet human needs and wants.
8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).

#### **Summative Assessments:**

- Portfolios, Self and Peer Assessment
- Performance Assessment
- Midterm/Final Exam
- Projects
- Rubric Assessment

#### **Formative Assessments:**

- Observations (Peer and Teacher)
- Participatory Rubrics
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#### **Enduring Understandings:**

- Planning is an essential component to design, construction, material usage, and efficiency.

#### **Essential Questions:**

- Why is planning an important aspect to project work?

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- How does planning influence efficiency?
- Why is planning vital to material usage and construction?
- How is the design of a product influenced by planning?

### Instructional Outcomes:

- Students will be able to successfully complete a bill of materials, create a plan of procedure, and select appropriate materials for each of their projects.

### Suggested Learning Activities:

- Demonstrate form usage.
- Participate in station and group work for linear, 2D, and 3D measurement.
- Read a working drawing to identify necessary information for forms.

### Suggested Differentiation:

- **Tier 1 Learners:** students provided one-to-one direct instruction, additional time, and auditory and visual supports
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**Unit 3: Materials**

**Unit Summary:** The basis for all woodworking materials is found in nature.

**Interdisciplinary Connections/Content Area Integrations Including Technology:**

- **Mathematics:** measuring
- **Science:** planning procedures
- **Technology:** use of machines and computers to generate plans and procedures

NJSLS Number	NJSLS Content
9.3.12.AC.6	Read, interpret, and use technical drawings, documents, and specifications to plan a project.
9.3.12.AC-CST.9	Safely use and maintain appropriate tools, machinery, equipment, and resources to accomplish construction project goals.
9.3.12.ED-TT.9	Utilize assessment and evaluation tools and data to advance learner achievement and adjust instructional plans.
9.3.MN-PRO.2	Manage safe and healthy production working conditions and environmental risks.
9.3.MN-PRO.4	Coordinate work teams when producing products to enhance production process and performance.

**Summative Assessments:**

- Portfolios, Self and Peer Assessment
- Performance Assessment



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- Midterm/Final Exam
- Projects
- Rubric Assessment

### **Formative Assessments:**

- Observations (Peer and Teacher)
- Participatory Rubrics
- Projects
- Research Assignments

### **Enduring Understandings:**

- The basis for all woodworking materials is found in nature.

### **Essential Questions:**

- What are forest materials?
- How are forest materials produced?
- What are the methods of drying lumber?
- What is the difference between nominal and actual size specifications?
- What are engineered lumber products?
- Why are specific forest products more suited to certain applications than others?
- Why are forest products considered a sustained industry?

### **Instructional Outcomes:**

- Students will be able to identify and select appropriate materials for their desired products.

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### Suggested Learning Activities:

- Demonstrate identification of wood species.
- Identify characteristics of general lumber and plywood.
- Identify and analyze the use of engineered lumber products for individual projects.
- Share the process of lumber production.
- Distinguish between hardwoods and softwoods.
- Identify characteristics used in lumber and plywood grading.

### Suggested Differentiation:

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### Notes/Comments:

## Unit 4: Cutting/Assembly

**Unit Summary:** Methods of advanced construction and assembly determine the difference in strength and quality.

**Interdisciplinary Connections/Content Area Integrations Including Technology:**

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- **Mathematics:** measuring
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NJSL Number	NJSL Content
9.3.12.AC.6	Read, interpret, and use technical drawings, documents, and specifications to plan a project.
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9.3.MN-PRO.2	Manage safe and healthy production working conditions and environmental risks.
9.3.MN-PRO.4	Coordinate work teams when producing products to enhance production process and performance.

- Summative Assessments:**
- Portfolios, Self and Peer Assessment
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  - Rubric Assessment
- Formative Assessments:**

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- Projects
- Research Assignments

### **Enduring Understandings:**

- Methods of advanced construction and assembly determine the difference in strength and quality.

### **Essential Questions:**

- What are the advanced methods of construction and assembly for shelves?
- What are the advanced methods of construction and assembly for tabletops?
- What are the advanced methods of construction and assembly for a wall display cabinet?
- What are the advanced methods of construction and assembly for doors?
- What are the advanced methods of construction and assembly for furniture assembling?

### **Instructional Outcomes:**

- Students will be able to properly assemble their pieces into a project using appropriate methodology.

### **Suggested Learning Activities:**

- Demonstrate proper uses of hand and machine tools needed to produce the best results.
- Practice the methodology of assembling a project.
- Demonstrate the various assembly jobs using glue and screws, glue and nail construction, or glued panel construction.
- View the streaming video clip of proper techniques.

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### Notes/Comments:

## Unit 5: Joinery/Fasteners

**Unit Summary:** Wood products use a variety of joinery techniques and fastening methods in their assembly.

### Interdisciplinary Connections/Content Area Integrations Including Technology:

- **Mathematics:** measuring
- **Science:** planning procedures
- **Technology:** use of machines and computers to generate plans and procedures

NJSLS Number	NJSLS Content
9.3.12.AC.6	Read, interpret, and use technical drawings, documents, and specifications to plan a project.

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9.3.12.AC-CST.9	Safely use and maintain appropriate tools, machinery, equipment, and resources to accomplish construction project goals.
9.3.12.ED-TT.9	Utilize assessment and evaluation tools and data to advance learner achievement and adjust instructional plans.
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### Summative Assessments:

- Portfolios, Self and Peer Assessment
- Performance Assessment
- Midterm/Final Exam
- Projects
- Rubric Assessment

### Formative Assessments:

- Observations (Peer and Teacher)
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### Enduring Understandings:

- Wood products use a variety of joinery techniques and fastening methods in their assembly.

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### Essential Questions:

- What are joinery techniques?
- What types of mechanical fasteners are used in wood product construction?
- What types of glues and adhesives are used in wood product construction?

### Instructional Outcomes:

- Students will be able to identify and utilize a variety of joinery techniques using various mechanical fasteners.

### Suggested Learning Activities:

- Demonstrate various advanced assembly jobs using rail and stile construction, dovetail, lap joint, and glued panel construction.
- Demonstrate proper usage, application, and capabilities of various fasteners.
- Utilize appropriate advanced joinery depending upon the application.
- Select and utilize appropriate glues and adhesives depending upon application.
- Select and utilize necessary mechanical fasteners depending upon the application.

### Suggested Differentiation:

- **Tier 1 Learners:** students provided one-to-one direct instruction, additional time, and auditory and visual supports
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**Notes/Comments:**

**Unit 6: Finishing**

**Unit Summary:** The type of finish on a wood product will determine its durability and application.

**Interdisciplinary Connections/Content Area Integrations Including Technology:**

- **Mathematics:** measuring
- **Science:** planning procedures
- **Technology:** use of machines and computers to generate plans and procedures

NJSLS Number	NJSLS Content
9.3.12.AC.6	Read, interpret, and use technical drawings, documents, and specifications to plan a project.
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**Formative Assessments:**

- Observations (Peer and Teacher)
- Participatory Rubrics
- Projects
- Research Assignments

**Enduring Understandings:**

- The type of finish on a wood product will determine its durability and application.

**Essential Questions:**

- What types of finishes would be used for an interior project?
- What types of finishes would be used for a project exposed to outside weather?
- What are the types of solvents used in the various finishes?
- What techniques are used to apply finish to a product?
- What are the procedures for cleaning up after applying finish to a project?

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### Instructional Outcomes:

- Students will be able to properly select, apply, and clean up stains and finishes required to enhance and to protect their project according to its intended purpose and use.

### Suggested Learning Activities:

- Review resources with information about advanced finishes and finishing methodologies.
- View demonstration of proper application of finishing products including clear stain wood finish, polyurethane, varnish, and paint.
- Select the appropriate protective coating per the application.

### Suggested Differentiation:

- **Tier 1 Learners:** students provided one-to-one direct instruction, additional time, and auditory and visual supports
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### Notes/Comments: