

Fair Lawn Public Schools

Fair Lawn, NJ

Advanced
Woods
Technology
Honors

August

2015

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The focus of the Engineering and Technology Department is to promote the development of **innovation** skills in all students. This is an introductory course in which students will learn and apply skills related to wood working.

**Engineering &
Technology
Education**

Learn. Innovation.

Fair Lawn School District

Committee Credits

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Advanced Woods Technologies

I. Course Synopsis

Advanced Woods Technologies is an advanced courses in which students will enhance and refine design and build skills and theories to the development of wood working projects. They will explore careers related to the wood working fields. This is primarily an independent study course.

II. Philosophy & Rationale

This course has been aligned to and developed with the [NJCCCS for Technology](#) as it's major focus, with a supplemental focus on the [Standards for Technological Literacy for the Content Study of Technology](#) (ITEA). In addition, the Next Generation Science Standards, particularly in [physical science](#) and [engineering and design](#) have been addressed along with the CCCS for [literacy in science and technical](#) subjects and [math](#). This demonstrates the integral nature of engineering into "STEM" education.

Students in Woods 2 will work to enhance what they had learned in Woods 1 and students in Woods 2 will enhance and develop what they had learned in Woods 2.

"Innovation" is defined as *the act or process of introducing new ideas, devices, or methods*". The philosophy of the Engineering and Technology Department to focus on the development of innovation in all students through the application of true, STEM education.

Differentiated instruction for students at different levels of achievement and specific learning needs (e.g. special education, English Language Learners (ELL), at-risk, and Gifted & Talented) is embedded in targeted scaffolding based on knowledge of each student's interests, needs, and assessment data, including, but not limited to, in class formative and summative assessments. Students in these courses are provided with clear, concise rubrics which describe and define expectations for project based, authentic assessment which involves written and/or performance based requirements.

When deemed appropriate, department teachers will engage students in purposeful paired discussions to share information more effectively, such as the "turn and talk" (Harvey & Daniels, 2009). "Text annotation" could be used, for example to optimize reading comprehension (Daniels & Steineke, 2010).

III. Scope & Sequence

Engineering & Design serves as an introductory course in which each unit will focus on a key component of the fields of engineering with a consistent focus on the design loop throughout the course.

Topic 1: Wood Working Safely (September)

- The safe use of tools, equipment and machines is essential for woodworking effectively.

Topic 2: Student Selection of Projects (October-November)

Topic 3: Independent Study Project 1 (December-January)

- Using machine tools properly allows us to produce quality woodworking pieces.

Topic 4: Independent Study Project 2 (February – March)

- Using the lathe properly allows us to produce quality woodworking pieces.

Topic 5: Culminating Experience (April-June)

*Students may repeat certain topics or topics may proceed out of order based on the availability of resources and the skills of individual students in class.

IV. Unit Descriptions

Topic 1: Woodworking Safely (1 Week)*

Enduring Understandings

1. The safe use of tools, equipment and machines is essential for effectively applying the engineering process.

Essential Questions:

1. How are tools, equipment and machines used safely?

Learning Objectives:

1. Identify tools, equipment, machines and their uses.
2. Identify and demonstrate how to safely use tools, equipment, and machines.

Suggested Activities & Suggested Modifications for Special Education Students, ELL Students, Students at Risk, and Gifted Students:

1. Practical exam on proper use of key tools, equipment and machines.
2. Modifications may include providing students with a template, diagrams, and additional resources for special education and ELL students.
3. Gifted students may be asked to assist their classmates in tool, equipment and machine identification.

Cross-Content Connections:

[Standards for Technology Literacy \(9-12\)](#)– 8H-K: Applying the Design Loop; 9I-K: Prototyping

Common Core Standards for English & Technical Subjects: [9-10](#); [11-12](#):

A focus in this unit will be following multistep processes.

***Safety will be stressed and monitored throughout the course.**

The following topics will be addressed throughout the school year. Within each unit, the objectives below will be highlighted and achieved. Students in Woods 2 will work at the intermediate level. Students in Woods 3 will work at the advanced level. Project specifications and expectations will be modified.

Topic 1: Wood Working Safely (September)

- The safe use of tools, equipment and machines is essential for woodworking effectively.

Topic 2: Student Selection of Projects (October-November)

Topic 3: Intermediate or Advanced Joinery (December-January)

- Using machine tools properly allows us to produce quality woodworking pieces.

Topic 4: Intermediate or Advanced Finishing (February – March)

- Using the lathe properly allows us to produce quality woodworking pieces.

Topic 5: Culminating Experience (April-June)

Project Selection & Design (Review)

1. Apply the concepts of project selection to choose a project which is achievable for ones skill level.
2. Create an accurate freehand sketch of an object.
3. Interpret and make working drawings of projects by applying an understanding of lines and symbols.
4. Apply mathematical skills such as board foot computation, measurement, conversions, and scaling.
5. Understand the tradeoffs between resources used, cost, and waste. (8.2.12.A.2)
6. Research design constraints. (8.2.12.B.1)
7. Create a prototype to solve a real-world problem, when possible. (8.2.12.D.1)

Wood Selection (Review)

1. Identify soft, hard, open-grained, and closed-grain wood.
2. Select the correct wood based on form and function for a given project or purpose.
3. Demonstrate proper handling and storage of wood.

Hand Tools (Review)

1. Correctly identify and use hand tools.
2. Demonstrate the ability to sharpen hand tools.
3. Perform straight and curved cuts.

Machine Tools (Review)

1. Correctly identify and use machine tools such as, but not limited to the drill press, scroll saw, belt sander, router, and lathe.
2. Perform straight and curved cuts using the proper tool.
3. Correctly select blades and demonstrate removal and installation.
4. Perform cuts with jigs.

Wood Joints (Advancing)

1. Identify types of joints.
2. Mark layout prints.
3. Use the doweling jig.
4. Create all common joint samples.
5. Common furniture joints for cabinets, tables, chairs, chests.

Adhesive (Review)

1. Define various types of adhesive and functions.
2. Use adhesive safely.

Wood Fasteners (Review)

1. Identify ways to fasten wood such as nails and screws.
2. Identify types of nails and their functions.
3. Identify types of screws and their functions.

Wood Finishing (Advancing)

1. Properly prepare surfaces through use of fillers and sanding.
2. Safely and accurately prepare and conduct wood staining and finishing.
3. Apply sealer when appropriate.
4. Select the appropriate finish.

Suggested Activities & Suggested Modifications for Special Education Students, ELL Students, Students at Risk, and Gifted Students:

1. Students with special needs may be provided with modified calculations and support in the area of design creation.
2. Modifications may include providing students with a template or to support the process and/or design specifications with reduced variables.
3. Gifted students may be asked to complete additional steps or address additional variables.

Cross-Content Connections:

[Standards for Technology Literacy \(9-12\)](#)– 8 Attributes of Design, 9 Engineering Design, 10 Role of Troubleshooting, 11 Applying the Design Process, 19 Manufacturing Technologies, 20 Construction Technologies.

Next Generation Science Standards - A focus in this unit will be on the

[real world applications of technology](#) (HS-ETS)

Common Core Standards for English & Technical Subjects: [9-10](#); [11-12](#):

A focus in this unit will be following multistep processes, key idea development and craft/structure.

Common Core Standards for Math:

A focus in this unit will be on [geometry](#), particularly the use of right triangles.

A focus in this unit will be on [numbers and quantities](#), particularly for the use of measurement.

Career Readiness Practices: A key idea in this unit is the focus on [career exploration](#) (NJCCCS 9.2).

V. Course Materials

This is a hands on course.

VI. Assessments

Classroom assessments are included to primarily guide instruction (formative assessment) and to support decisions made beyond the classroom (summative assessment).

Summative assessment will be authentic in nature. Students will be asked to complete design challenges and other performance based assessments. These assignments will typically involve a design, build, test, and redesign competent. Assessment will be rubric based.

VII. Interdisciplinary Connections and Alignment to Technology Standards

Interdisciplinary connections have been noted within each unit in the previous pages.

Careful attention will be paid in this course to form meaningful connections between the application of literacy for technical subjects, math skills and standards, career exploration, and the Next Generation Science Standards.

Engineering & Technology Education classes in the Fair Lawn Public schools promote career-readiness skills related to Personal Financial Literacy (9.1) and Career Awareness, Exploration, and Presentation (9.2). Some course concepts from the Career and Technical Education Standards (9.3), but these are not directly correlated since our district is not a CTE program.

The Fair Lawn Public Schools District fosters an environment that promotes career-readiness skills in all content areas. Whereas [Career Ready Practices](#) are explored consistently, specific alignment to [Personal Finance Literacy \(9.1\)](#) and [Career Awareness, Exploration, and Presentation Standards \(9.2\)](#) are included in the district level document (below). When appropriate, the [Career and Technical Education Standards \(9.3\)](#) have been reviewed and aligned as well.

Examples: 9.2B: Career exploration in each unit of study.

In addition, every effort is made to integrate technology and engineering into our science classes. [Educational Technology \(8.1\)](#) and [Technology Education, Engineering, Design, and Computational Thinking – Programming \(8.2\)](#) standards are cross connected throughout our science programs.

Examples: 8.1A: Use spreadsheets to analyze & interpret data from laboratories, 6-12.
Use the internet to increase productivity and efficiency, 9-12.
8.1B,C: Use data to solve real-world problems, 6-12.
Use online platforms to collaborate & address global issues, 9-12.
8.1F: Collect and analyze data using internet and data simulations, 6-12.

- 8.2A: Become aware of the invention process, 3-5.
- 8.2B: Become aware of the global impacts on technology, 6-12.
- 8.2C: Apply the design process to pushes & pulls, K-2.
- 8.2D: Use tools to reduce work, K-2.

For additional detail on how these standards are integrated throughout the Fair Lawn Schools curriculum, review the Fair Lawn Public Schools District Alignment to Technology & Career Readiness & 21st Century Skills Standards Curriculum Appendix.