ADVANCED MATERIALS & FABRICATION
Grade(s) 11-12

Unit # 1
Safety and Procedural Skills

Essential Question
How do workplace safety practices impact individuals and the broader industry?

Unit Summary
Students will explore the importance of safety in industrial settings, including accident prevention, OSHA regulations, and emergency response protocols. They will learn and practice proper safety procedures to create a secure working environment.

Guiding Questions
Content

- What is basic personal protective equipment (PPE)?
- What are safety practices specific to each tool or machine?

Process

- How do you properly inspect and use PPE?
- What are the steps to safely lift and transport heavy materials?
- How do safety procedures differ between various tools and equipment?

Reflective

- Why do workplace safety practices matter in an industrialized society?
- What consequences can result from neglecting safety protocols?
- How can safety training benefit career growth in skilled trades?

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Priority Standards

- 0.1 - Demonstrate an understanding of industry standards for personal safety including the safe use of tools, equipment, and hazardous materials.
- 0.2 - Demonstrate time management skills.
- 0.3 - Create and utilize employment documents including a resume and portfolio.
- 0.4 - Demonstrate job seeking and interview skills.

Supporting Standard

- 1.1 - Act as a responsible and contributing citizen and employee.
- 1.3 - Attend to personal health and financial well-being.
- 1.5 - Consider the environmental, social, and economic impact of decisions.
- 1.9 - Model integrity, ethical leadership and effective management.
- 2.1 - Use vocabulary, symbols, and formulas commonly used in design and construction.
- 2.3 - Comply with regulations and applicable codes to establish and manage a legal and safe workplace/jobsite.

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Unit #2
Project Planning and Design

Essential Question
How does effective planning and design impact the success of a fabrication project?

Unit Summary
Students will develop project plans by selecting materials, creating a bill of materials, and estimating costs. The unit also explores the principles of design and how they apply to fabrication.

Guiding Questions
Content

- What are the key principles of project design in fabrication?
- How do material selection and budgeting impact project feasibility?
- What role does computer-aided design (CAD) play in project planning?

Process

- How do students create an effective plan of procedure for a fabrication project?
- What steps are involved in estimating project costs accurately?
- How does CAD software contribute to efficiency and accuracy in planning?

Reflective

- How does effective planning improve project outcomes?
- What challenges did you face in project planning, and how did you overcome them?
- How does teamwork influence project planning and material selection?

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Priority Standards

- 1.1 - Properly use, maintain, and care for machines and care for hand and power tools common to industry.
- 1.2 - Properly set up, maintain, and care for machines as they are used for constructing projects.
- 1.3 - Apply the principles and elements of design to create project plans, which fulfills the criteria for the project to be constructed.
- 1.4 - Select the appropriate materials based upon; strength, appearance, and durability requirements of the project designed.
- 1.5 - Create a bill of materials and a plan of procedure for a project being planned for construction.
- 1.6 - Estimate costs of a project.

Supporting Standards

- 1.1 - Act as a responsible and contributing citizen and employee.
- 1.2 - Apply appropriate academic and technical skills.
- 1.5 - Consider the environmental, social, and economic impact of decisions.
- 1.6 - Demonstrate creativity and innovation.
- 1.8 - Utilize critical thinking to make sense of problems and persevere in solving them.
- 1.9 - Model integrity, ethical leadership and effective management.
- 1.11 - Use technology to enhance productivity.
- 2.1 - Use vocabulary, symbols, and formulas commonly used in design and construction.
- 2.2 - Use architecture and construction skills to create and manage a project.
- 2.3 - Comply with regulations and applicable codes to establish and manage a legal and safe workplace / jobsite.
- 2.5 - Understand the roles and responsibilities among trades and professions, including labor / management relationships.
- 2.6 - Read, interpret, and use technical drawings, documents, and specifications to plan a project.

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Unit #3
Project Construction

Essential Question
How do construction techniques impact the quality and durability of a fabricated product?

Unit Summary
Students will explore best practices for joint construction, finishing techniques, and material fabrication. This unit also covers assembly and finishing processes.

Guiding Questions
Content

- What are the different types of joint construction methods?
- How do finishing techniques affect the longevity and aesthetics of a product?
- What factors determine the best fabrication method for a given material?

Process

- How can students research and apply effective assembly techniques?
- What are the steps in selecting and applying appropriate finishes?
- How do different fabrication techniques impact overall product strength?

Reflective

- What challenges did you encounter in the construction process?
- How did material choices affect the construction process and final product?
- What improvements would you make in future fabrication projects?

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Priority Standards

- 2.1 - Research, select, and perform “best method” joint construction and assembly technique for the project being constructed.
- 2.2 - Research, select, and perform the appropriate finish for the project being constructed.
- 2.3 - Research, select, and perform composite materials fabrication.
- 2.4 - Research, select, and perform overlay/veneer materials fabrication.
- 2.5 - Research, select, and perform appropriate tooling methods for chosen materials.
- 2.6 - Research, select, and perform appropriate methods of assembly for materials and applications.

Supporting Standards

- 1.1 - Act as a responsible and contributing citizen and employee.
- 1.2 - Apply appropriate academic and technical skills.
- 1.3 - Attend to personal health and financial well-being.
- 1.6 - Demonstrate creativity and innovation.
- 1.8 - Utilize critical thinking to make sense of problems and persevere in solving them.
- 1.9 - Model integrity, ethical leadership and effective management.
- 1.11 - Use technology to enhance productivity.
- 2.1 - Use vocabulary, symbols, and formulas commonly used in design and construction.
- 2.2 - Use architecture and construction skills to create and manage a project.
- 2.3 - Comply with regulations and applicable codes to establish and manage a legal and safe workplace / jobsite.
- 2.5 - Understand the roles and responsibilities among trades and professions, including labor / management relationships.
- 2.6 - Read, interpret, and use technical drawings, documents, and specifications to plan a project.

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Unit #4
Production Systems

Essential Question
How do advanced technology systems enhance efficiency in production?

Unit Summary
This unit focuses on CAD/CAM software, production flow management, and safety program implementation. Students will analyze automation and its role in modern manufacturing

Guiding Questions
Content

- What is the role of CAD/CAM in modern fabrication?
- How do different production systems impact efficiency and cost?
- What are key safety considerations in an automated production environment?

Process

- How can students design and engineer a product using CAD/CAM?
- What strategies can improve production flow management?
- How do manufacturers implement and manage safety programs?

Reflective

- How has learning about advanced production systems changed your perspective on manufacturing?
- What challenges arise when integrating technology into production?
- How do you see automation shaping the future of fabrication?

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Priority Standards

- 3.1 - Design and engineer a product using CAD and/or CAM software systems.
- 3.2 - Understand and demonstrate operations of advanced technology systems.
- 3.3 - Demonstrate effective techniques to manage and organize production flow.
- 3.4 - Research and understand related career fields and postsecondary training opportunities.
- 3.5 - Implement and manage a safety program for procedures and hazardous materials.

Supporting Standards

- 1.1 - Act as a responsible and contributing citizen and employee.
- 1.2 - Apply appropriate academic and technical skills.
- 1.3 - Attend to personal health and financial well-being.
- 1.6 - Demonstrate creativity and innovation.
- 1.8 - Utilize critical thinking to make sense of problems and persevere in solving them.
- 1.9 - Model integrity, ethical leadership and effective management.
- 1.11 - Use technology to enhance productivity.
- 2.1 - Use vocabulary, symbols, and formulas commonly used in design and construction.
- 2.2 - Use architecture and construction skills to create and manage a project.
- 2.3 - Comply with regulations and applicable codes to establish and manage a legal and safe workplace / jobsite.
- 2.5 - Understand the roles and responsibilities among trades and professions, including labor / management relationships.
- 2.6 - Read, interpret, and use technical drawings, documents, and specifications to plan a project.

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Unit #5
Career and Employability Skills

Essential Question
How can woodworking and skill trades translate into career opportunities and professional success?

Unit Summary
This unit will explore career pathways in woodworking, furniture making, and construction. Students will learn about employability skills, workplace expectations, and opportunities for further education and training.

Guiding Questions
Content

- What career opportunities exist in woodworking and related fields?
- What skills are employers looking for in the woodworking industry?
- What are the key components of a strong resume and portfolio?

Process

- How do you prepare for a woodworking job interview?
- What strategies can be used to network with industry professionals?
- How do you showcase your woodworking skills in a professional setting?

Reflective

- What woodworking skills do you feel most confident in applying to a job setting?
- How can you continue developing your skills after completing this course?
- How has this course influenced your career interests?

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Priority Standards

- 4.1 - Communicate effectively in on-the-job situations using verbal and written skills in various delivery modes (face-to-face, virtual, etc.)
- 4.2 - Demonstrate knowledge and use of computer systems and word processing software in effective communication.
- 4.3 - Create and utilize employment documents including a resume and portfolio.
- 4.4 - Demonstrate job seeking and interview skills.
- 4.5 - Demonstrate the ability to achieve common goals through teamwork.

Supporting Standards

- 1.1 - Act as a responsible and contributing citizen and employee.
- 1.2 - Apply appropriate academic and technical skills.
- 1.3 - Attend to personal health and financial well-being.
- 1.9 - Model integrity, ethical leadership and effective management.
- 1.10 - Plan education and career path aligned to personal goals.
- 2.4 - Understand the nature and scope of the Architecture & Construction Career Cluster and the role of architecture and construction play in society and the economy.
- 2.7 - Evaluate a wide range of career pathway opportunities for success in architecture and construction careers.

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