Metals and Fabrication 016005……6330

Course Description

This is a beginning level course that introduces the student to basic knowledge and skills that are foundational to metals fabrication. Safety, measuring, planning and production processes will be covered.

Course Code:

Program(s) of Study to which This Course Applies

- Power, Structural and Technology Systems

Course Framework	Reference Standards	Academic Crosswalk
Standard 1. Students will demonstrate a complete understanding of need for shop safety and rules governing the use of equipment.	INCT 1400 Course Objective	[TBD by NDE]
Benchmark 1.1. Understand the main hazards that are possible in the shop setting. Sample performance indicators: • Identify the types of risks of injury/illness in the lab. • Identify and describe how common hazards in the lab. • Explain the role of government agencies in providing a safe workplace. • Identify and describe major sources of information about hazards in the workplace. (e.g., MSDS, work procedures, exposure control plans, training materials, labels, and signage.) • Interpret safety signs and symbols.	KS MNC06.01 Sample Indicators KS MNC06.03 Sample Indicators KS MNC06.05 Sample Indicators	[TBD by NDE]
Benchmark 1.2. Observe proper dress and use of personal protective equipment. Sample performance indicators: • Wear proper clothing for each particular content area. (e.g., Welding- long sleeves, high-buttoned collar, no baggy clothing, pants long enough to cover top of boots, proper foot protection, welding caps) • Inspect and use personal protective equipment (PPE). • Verify that safety and personal protective equipment is available, performs correctly, and has current certification.	KS MNC06.04 Sample Indicators KS MNPB07.01.03	

Benchmark 1.3. Demonstrate proper handling and storing of materials. Sample performance indicators: • Understand the proper storage of flammable chemicals. • Identify methods of disposing of hazardous materials. • Demonstrate principals of safe physical movement to avoid slips, trips, and spills. • Learn the correct way to lift and move materials. • Proper handling of cylinders in a welding shop. • Make sure work area is clean and free of obstructions. • Identify procedures necessary for maintaining a safe work area. • Follow good housekeeping procedures.	KS MNC06.04 Sample Indicators KS MNC06.05 Sample Indicators KS MNPB07.01.03	
Benchmark 1.4. The student will demonstrate proper machine and tool safety and operation. Sample performance indicators: • Understand proper use of hand tools, power tools and machine equipment. • Demonstrate proper orientation and operation of equipment. • Demonstrate proper safety procedures with all equipment.	KS MNC10.01.02 KS MNPB07.01.01	
Standard 2. Students will develop the ability to apply mathematical skills while working with fractions and decimals.	INCT 1400 Course Objectives 1 and 2	[TBD by NDE]
Benchmark 2.1 The student will use common measurement systems. Sample performance indicators: • Measure accurately. • Review fractions, decimals, and their conversions.	INCT 1400 Course Objectives 1 and 2	
Benchmark 2.2 The student will understand mathematical equations and computations. Sample performance indicators: • Estimate material needs. • Implement geometry calculations.(e.g., area, volume, and mass)		

Standard 3. Students will demonstrate the planning and layout processes used in manufacturing.	KS MNC10.01.01	[TBD by NDE]
Benchmark 3.1 The students will read and/or produce prints. Sample performance indicators: • Develop sketches of a product. • Develop basic, working and detail drawings. • Identify line types, lettering, and symbols. • Understand scale. • Identify and explain lines, material fills, and sections. • Identify and explain object views. • Identify and explain dimensioning. • Interpret elements of the different types of drawings.	KS MNC10.01.01 NCCER Module 29202-03	[TBD by NDE]
Benchmark 3.2 The students will understand the scheduling process. Sample performance indicators: • Identify the steps required to create the product. • Identify the equipment used to create the product. • Make sure the production schedules are met effectively. • Be aware of schedule requirements in a timely way.	KS MNPB06.01.04	
Benchmark 3.3 The students will be able to identify and understand materials used in the manufacturing process. Sample performance indicators: • Study and select raw materials that best fits the needs of the production process. • Acquire knowledge of materials, their properties and methods to use them. • Identify and explain the selection of materials. • Identify and explain the composition and classification of materials. • Identify and explain the physical characteristics and mechanical properties of materials. • Identify and explain forms and shapes of structural materials. • Describe and give examples of materials used in common manufacturing products.	KS MNPB08.01.02 KS MNC10.01 NCCER Module 29201-03 NCCER Module 29202-03	

Benchmark 3.4 The students will understand estimating materials and cost of materials and products. Sample performance indicators: • Develop parts list and bill of materials. • Develop cost analysis. • Identify and explain notes and bill of materials. • Figure product cost. • Estimate materials needed for products.	INCT 1400	
Standard 4. The student will employ technical skills and knowledge required for careers in metals and fabrication in order to perform basic workplace activities.	KS MNC10.01	[TBD by NDE]
Benchmark 4.1. The student will demonstrate how materials can be processed using tools and machines. Sample performance indicators: • Set up equipment for the production process. • Use tools and the processes of cutting, shaping, grinding, combining, forming, etc. of materials to manufacture a part or product. • Perform and monitor the process to make the product.	KS MNC10.01.02 MSSC	
Benchmark 4.2. The student will demonstrate various types of assembling processes (e.g., welding, mechanical fastening, and mechanical force joining). Sample performance indicators: • Demonstrate welding with the following processes: O-A, Arc, MIG, and TIG. • Select consumable supplies for the welding process. • Apply appropriate fastening or joining procedures to the design and production of a manufactured part of product (examples: butt, lap, and T welds).	KS MNC10.01.03	
Benchmark 4.3. The student will properly finish the selected product (e.g., types of finishing materials, surface preparation, and methods of application). Sample performance indicators: • Select a finishing process for a product appropriate to the job it must perform, environment in which it functions, and its aesthetic appeal.	KS MNC10.01.04	

Standard 5. The student will know and understand the importance of employability skills. Explore, plan, and effectively manage careers.	KS MNC09	[TBD by NDE]
Benchmark 5.1. The student will research possible career opportunities in the content area. Sample performance indicators: • Research possible careers in the particular content area. • Select a career of choice to research and present.		[TBD by NDE]

Reference Standards Sources

- MSSC= MSSC Standards Certification
- WSC= ITE 108 Manufacturing Systems
- NCCER= National Center for Construction Education and Research-Welding
- MCC= Introduction to Precision Machine Technology INCT 1400
- KS = Career Clusters Knowledge and Skills Statements. Revised 2008. National Career and Technical Education Foundation, Silver Spring, MD. www.careerclusters.org.

Other Information

Suggestions for innovative teaching and learning strategies:	•
Related assessments:	•
Extended learning opportunities:	• FFA Career Development Contests or SkillsUSA contests (e.g., Cabinetmaking, Welding, CNC, etc.)