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Manufacturing

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# Colorado CTE Course – Scope and Sequence

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| **Course Name** | **Metal Sculpting** | | **Course Details**<br><br>**This course covers all competencies in WEL 264.**<br>**Course = 0.50 Carnegie Unit Credit** | **Credit= 0.5**<br><br>**Prerequisite: Welding Technology I**<br><br>**CTE Credential: CTE Manufacturing** | |
| **Course Description** | Metal sculpting introduces metal production in relation to commercial and industrial welding art and sculpture. The course is designed for continuous welding students. The course allows students to fabricate a sculpture of art using welding fabrication techniques, structure of assembly through the process of correct design and layout all producing a professional portfolio in relation to the final project. | | | | |
| **Note:** | This is a suggested scope and sequence for the course content. The content will work with any textbook or instructional resource. If locally adapted, make sure all essential knowledge and skills are covered. This course covers all competencies in WEL 264. | | | | |
| SCED Identification # | 13209 | Schedule calculation based on 60 calendar days of a 90-day semester. Scope and sequence allows for additional time for guest speakers, student presentations, field trips, remediation, or other content topics. | | | |
| All courses taught in an approved CTE program must include Essential Skills embedded into the course content. The Essential Skills Framework for this course can be found at **https://www.cde.state.co.us/standardsandinstruction/essentialskills** | | | | | |
| Instructional Unit Topic | Suggested Length of Instruction | CTE or Academic Standard Alignment | Competency / Performance Indicator | Outcome / Measurement | CTSO Integration |
| **Safety** | | Interpret policies, procedures, and regulations for the workplace environment, including employer and employee responsibilities. | Comply with standard industry and classroom safety requirements. Student is expected to:<br>(A) locate, and adhere to, Material Safety Data Sheet (MSDS) instructions;<br>(B) apply Personal Protective Equipment (PPE) precautions;<br>(C) use health and safety practices for storing, cleaning, and maintaining tools, equipment, and supplies; | Identify the benefits of knowing and applying basic safety procedures in both an agricultural laboratory and workplace. Interpret current Occupational Safety and Health Administration (OSHA) guidelines to conduct a compliance review of the construction laboratory, including a written summary justifying the findings | SkillsUSA Welding Sculpture Contest |

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| | | | (D) be informed of laws/acts pertaining to the Occupational Safety and Health Administration (OSHA). | with recommendations for improving the safety of working conditions.<br><br>Review common laboratory safety procedures for tool and equipment operation in the construction laboratory, including but not limited to accident prevention and control procedures.<br><br>Demonstrate the ability to follow safety and operational procedures in a lab setting and complete a safety test with 100 percent accuracy. | |
| **Introduction to Sculpture** | | Understand historical and modern applications of welded sculpture.<br><br>Understand important trends and design philosophies related to metal art and sculpture. | Student is expected to:<br>A) Understand the transition from traditional sculptural mediums such as marble, wood, and cast bronze, to the beginnings of welded steel sculpture;<br>B) Understand aesthetic design ideas;<br>C) Demonstrate knowledge of contemporary sculptural trends and concepts from historic examples; | | |

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| | | | D) Demonstrate critical analysis of sculptural works of art using appropriate terminology. | | |
| **Design Concepts** | | Understand and apply design concepts to the fabrication of metal art and sculpture. | Understand and apply design concepts used for creating metal sculptures. Student is expected to:<br><br>A) Understand the concept of 3D shaping;<br>B) Understand Form vs. hollow/open forms;<br>C) Understand armature concepts; and<br>D) Understand the Fibonacci Spiral concept | | |
| **Material** | | Identify and select appropriate metal materials for sculptures.<br><br>Understand the physical properties of metal materials. | Identify and select appropriate metal materials for sculptures. Student is expected to:<br><br>A) Understand the uses and applications for various metal materials used in sculptures, including mild steel, aluminum, stainless steel, and silicon bronze;<br>B) Understand the physical properties of various metals used in metal art and sculpture;<br>C) Understand the precautions when working with various metals; and | | |

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| | | | D) Understand the joining and forging techniques used for various metals. | | |
| **Sculpting Techniques** | | Understand and apply sculpting techniques to create metal art or sculpture. | Use common techniques for creating metal art and sculpture pieces. Student is expected to:<br><br>A) Demonstrate hammered sheet over armature techniques;<br>B) Demonstrate working strap;<br>C) Demonstrate shaping strap;<br>D) Demonstrate cobra w/ cutter assembly;<br>E) Demonstrate tack-n-bend, plier techniques, and corrections;<br>F) Demonstrate measurement, squaring, leveling, and jig making;<br>G) Demonstrate adding a rod;<br>H) Demonstrate adding a space<br>I) Demonstrate padding for volume;<br>J) Demonstrate how to angle torch to carve away; and<br>K) Sculpt surfaces with the torch. | | |
| **Lines and Spaces** | | Understand metal sculpting techniques to harmonize lines and spaces. | Understand and apply techniques to create lines and spaces in metal art and sculpted pieces. Student is expected to; | | |

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| | | | A) Understand the concept of harmonizing lines and creating spaces,<br>B) Demonstrate spiral shaping and natural forms;<br>C) Create dynamics and action, implied physique, and ribbons wrapping form. | | |
| **Development of Project Plans** | | Demonstrate ability to develop a project plan for metal sculpture or metal art construction. | Demonstrate understand of how to develop a project plan for a metal sculpture or metal art application. Student is expected to:<br>A) Demonstrate measurement, squaring, leveling, and bracing to avoid distortion;<br>B) Demonstrate bracing and jig building;<br>C) Understand welding symbols on a blueprint;<br>D) Research ideas for projects on internet;<br>E) Obtain relevant information from pictures and basic shop drawings; and<br>F) Design and interpret dimensions and notes. | | |
| **MIG Welding** | | Apply MIG welding techniques to create metal art and sculpture | Apply MIG welding techniques to create metal art and sculpture. Student is expected to:<br><br>A) Demonstrate MIG welding as an attaching tool and as sculpting tool; | | |

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| | | | B) Demonstrate resurfacing MIG w/ oxy techniques; and<br>C) Create forged shapes and beveled joints. | | |
| **Oxy-acetylene** | | Understand and apply oxy-acetylene cutting techniques to create metal art and sculpture. | Understand and apply cutting torch techniques to create metal art and sculpture. Student is expected to:<br><br>A) Demonstrate basic oxy/acetylene and plasma cutting skill;<br>B) Demonstrate cutting torch corrections, to lengthen or shorten pie slice on curves; and<br>C) Use the cutting torch for rerouting ribbons. | | |
| **Texture and Finish** | | Create texture and finishes on metal art or metal sculptures. | Understand the concept of texture;<br>A) Demonstrate various techniques to create texture of finishes, including coloring metal with an oxy/acetylene torch; and<br>B) Understand how to weld joints for texturized materials. | | |
| **SMAW** | | Understand the SMAW process applications for creating metal art, sculpture, or for commercial artistic metal joining applications. | Understand the SMAW process applications for creating metal art, sculpture, or for commercial artistic metal joining applications. Student is expected to: | | |

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| | | | A) Understand the uses for SMAW welding to create metal fabricated art;<br>B) Understand how to use the 110 inverter; and<br>C) Identify common industrial artistic applications of the SMAW welding process. | | |
| **Economics of Fabrication** | | Demonstrate understand of economic considerations for fabricated metal art. | Demonstrate understand of economic considerations for fabricated metal art. Student is expected to:<br>A) Understand basic estimating for metal fabricators;<br>B) Investigate basic marketing principals;<br>C) Understand concepts related to economical and sustainable design. | | |
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