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Course Outline for WLDT 71

WELDING FOR THE ARTS

Effective: Fall 2008

I. CATALOG DESCRIPTION:

WLDT 71 — WELDING FOR THE ARTS — 3.00 units

Provides basic welding, shop skills and instruction that artistically inclined individuals should know in order to be effective in the process of creating metal art and sculpture. Provides instruction on types of metals (aluminum, iron, steel, cast iron, bronze, stainless steel, etc.), mechanical fastenings, cutting and permanent joining together of metals and alloys through welding processes such as SMAW, GMAW, GTAW, FCAW, oxyacetylene and braze welding, plasma and fuel gas cutting. Instruction includes general shop safety, equipment use, finishing, welding electricity fundamentals, welding consumable identification, and hazardous materials regulation.

1.00 Units Lecture 2.00 Units Lab

Grading Methods:

Letter or P/NP

Discipline:

	<u>MIN</u>
Lecture Hours:	18.00
Lab Hours:	108.00
Total Hours:	126.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 4

III. PREREQUISITE AND/OR ADVISORY SKILLS:

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

- A. Operate safety in a typical welding environment;
- B. Operate, understand usage and set-up of typical welding power supplies;
- C. Demonstrate use of basic shop equipment and hand tools;
- D. Identify common metals used for metal artwork;
- E. Explain application, use and theory of welding, cutting and gouging as they relate to art;
- F. Identify and explain welded art materials, electrodes, gasses and consumables;
- G. Develop skills using SMAW, GMAW, GTAW, FCAW, OFW, PAC and AAC in the flat position;
- H. Develop artistic drawing, sketching, and planning of metal art work;
- I. Develop and understanding of different forms of metal art and sculpture;
- J. Identify important metal artists;
- K. Develop an understanding and appreciation of full-scale public metal artwork;
- L. Develop an understanding of mixed media as it relates to metal art and sculpture;
- M. Explain methods for applying mechanical finishes to metal;
- N. Explain methods for applying chemical finishes to metal;
- O. Explain the equipment and processes associated with forming and forging;
- P. Explain various mechanical fasteners used to join metal;
- Q. Demonstrate basic safety and hazards associated with metal fabrication;
- R. Practice basic shop and welding equipment care and maintenance.

V. CONTENT:

- A. Safety in and around the welding shop environment
 1. Personal Protective Equipment (PPE)
 2. General shop safety
 3. Shop environment and awareness
 4. Accident prevention practices
- B. Welding power supplies and their applications
 1. Constant Current (CC)
 2. Constant Voltage (CV)
 3. Engine Driven
 4. Transformer
 5. Rectifier
 6. Inverter
 7. Pulsed

8. Electricity provided by utilities
- C. Instruction on the safe use of shop equipment and hand tools
 1. Hand tools
 2. Power tools
 3. Welding auxiliary and support equipment
 4. Care and proper use
- D. Common metals, properties, shapes and forms as they relate to art
 1. Steel
 2. Stainless Steel
 3. Aluminum
 4. Copper
 - a. Brasses
 - b. Bronzes
 5. Magnesium
 6. Nickel
 7. Titanium
 8. Casting
 9. Common metal forms
 - a. Sheet
 - b. Plate
 - c. Bar
 - d. Angle
 - e. Channel
 - f. Beam
 - g. Pipe
 - h. Tubing
 - i. Expanded and perforated metals
 - j. Wire cloth
 - k. Extrusions
 - l. Hot rolled vs. Cold rolled
 - m. Material costs
 - n. Material suppliers
 - o. Things to avoid
- E. Application, use and theory of welding, cutting and gouging as they relate to art
 1. Welding process
 - a. Adhesion processes, application and uses
 - b. Fusion processes, application and uses
 2. Cutting and gouging processes
 - a. Oxy-fuel process, application and uses
 - b. Plasma process, application and uses
 - c. Carbon arc process, application and use
- F. Welded art related materials and consumables
 1. Welding electrodes
 2. Welding consumables
 3. Welding asses
- G. Skills using SMAW, GMAW, GTAW, FCAW, OFW, PAC and AAC in the flat position
 1. Hands-on instruction, practice and use of Shielded Metal Arc Welding (SMAW)
 2. Hands-on instruction, practice and use of Gas Tungsten Arc Welding (GTAW)
 3. Hands-on instruction, practice and use of Gas Metal Arc Welding (GMAW)
 4. Hands-on instruction, practice and use of Flux Core Arc Welding (FCAW)
 5. Hands-on instruction, practice and use of Oxy Fuel Welding (OFW)
 6. Hands-on instruction, practice and use of Plasma Arc Cutting (Pac)
 7. Hands-on instruction, practice and use of Air Arc Cutting (AAC)
- H. Artistic drawing, sketching, and planning of metal art work
 1. Taking ideas and making reality with metal
 2. Sketching, models and scale factors as a method of planning
 3. Fabrication planning and steps
 - a. Plan
 - b. Prep
 - c. Fabrication
 - d. Finish
- I. Different forms of metal art and sculpture
 1. 2 Dimensional
 2. 3 Dimensional
 3. Static
 4. Kinetic
 - a. Motorized
 - b. Mobiles
 - c. Fountains
 5. Interactive
 6. Evolutionary
- J. Famous artists that use metal and welding
 1. Past
 2. Present
 3. Emerging
- K. Contemporary full-scale public metal art
 1. Field trip to public venue
 2. Internet searches and content
 3. Personal exploration of local community and environment
- L. Mixed media as it relates to metal art and sculpture
 1. Glass
 2. Wood
 3. Stone or Rock
 4. Ceramic
 5. Other materials
- M. Mechanical finishes of metal
 1. Grinding
 2. Sanding
 3. Graining
 4. Polishing

5. Abrasives
6. Sand blast
7. Glass Bend blast
8. Peening
9. Chipping
10. Hammered
11. Tumbled
12. Distressed
- N. Chemical finishes of metal
 1. Rust
 2. Patina
 3. Paints
 - a. Material Prep
 - b. Primers
 - c. Wet paints
 - d. Epoxy
 - e. Acrylic
 - f. Clear coats
 - g. Powder Coat
 4. anodize
 5. Plating
 6. Galvanizing
 7. Electro polish
 8. Black Oxide
 9. Etched
- O. Forming and forging
 1. Forming equipment
 2. Forging equipment
- P. Fasteners used to join metals
 1. Threaded fasteners
 - a. Nuts
 - b. Bolts
 - c. Screws
 - d. Washers
 - e. Tap and Die usage
 2. Rivets
 - a. Hot
 - b. Cold
 - c. Pop
- Q. Hazardous material safety regulations and norms
 1. PPE
 2. MSDS
 3. OSHA
- R. Shop and welding equipment care and maintenance
 1. General maintenance tips
 2. Shop housekeeping
 3. Tool repair and upkeep

VI. METHODS OF INSTRUCTION:

- A. **Lecture** -
- B. Visual presentations
- C. **Field Trips** -
- D. **Guest Lecturers** -
- E. **Demonstration** -

VII. TYPICAL ASSIGNMENTS:

- A. Read chapter related to metal artwork
- B. Discuss the chapter content
- C. Use the information in the chapter in individual metal art project

VIII. EVALUATION:

A. **Methods**

1. Exams/Tests
2. Quizzes
3. Class Participation
4. Lab Activities
5. Other:
 - a. Methods
 1. Class participation
 2. Safe operation in laboratory and safe use of equipment
 3. Quality and quantity of artwork produced
 4. Quizzes
 5. Exams

B. **Frequency**

IX. TYPICAL TEXTS:

1. Antonio, Jose *Metal, Forming, Forging and Soldering Techniques.*, Ares Barron, 2006.
2. Ruth, Karen *Artisan Welding Projects.*, Creative Publishing, 2006.
3. Meilach, Donna *Decorative and Sculptural Ironwork.*, Schiffer Pub, 1996.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Personal protective equipment
- B. Welding gloves
- C. Welders safety glasses
- D. Leather boots or whose
- E. Tungsten
- F. Metal for personal projects

