Clemson University
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Education & Training Plan
Welding Technician Certification Program with Externship

Student Full Name: _____

Start Date: _____ End Date: _____

Program includes National Certification & an Externship Opportunity
Mentor Supported

Clemson University Program with Externship

Course Code:	CLEM-TRDE-WELD
Program Duration:	6 Months
Course Contact Hours:	375
Student Tuition:	$3,999.00

The Welding Technician Profession

Welding is a high-tech industry that can take you places all over the world. From ladders to aircraft carriers, from NASCAR to national defense, and from the laboratory to sales and repair, the varied welding industry impacts virtually every industry. Technology is creating more uses for welding in the workplace. The Welding Technician program is designed to prepare students to support industrial, transportation, oil and gas, constructing, and many other industries with welding skills. The work of welders includes joining pipe sections for oil and natural gas pipelines, working in numerous industrial environments, building ships, and supporting construction. Students can serve in positions such as Welders, Cutters, Solderers and Brazers.

This program provides learners the entry level skills required to start a career in welding. This course is designed to prepare students to earn multiple credentials through the American Welding Society (AWS) Schools through National Skill Standards Education (SENSE) Level 1 Certification. Students are eligible for an optional externship with a local employer after successful course completion.

Education and National Certifications

- Students should have or be pursuing a high school diploma or GED
- National Certification exam available to students who successfully complete this program:
  - **American Welding Society (AWS) SENSE Certificate of Completion**

Program Objectives:

After completing this program, learners will be able to:

- Select and properly use safety equipment, protective clothing, and procedures applicable to the cutting and welding of metals
- Describing basic welding processes, the welding trade, and training/apprenticeship programs
- Applying welding safety practices and using personal protective equipment related to the welding trade
- Applying knowledge and skills related to safety practices, equipment, consumables, setup, and use of equipment for oxyfuel cutting, plasma arc cutting, air-carbon arc cutting and gouging
- Applying knowledge and skills related to safe preparation of base metals and basic cleaning, basic weld joint design, types of welds and joint preparation
- Applying knowledge of various codes and assessing weld quality
- Applying knowledge and skills related to SMAW (shielded metal arc welding) including safety, equipment, setup, electrodes and their care and handling, bead and fillet welds, groove welds with backing, and open-root groove welds
- Applying knowledge of welding symbols and welding drawings

National Certification

Students who complete the Clemson University Welding Technician program will be prepared to sit for the AWS SENSE Entry Level Welder Certificate of Completion national certification exam(s). In order to work as a Welding Technician, many states nationwide are requiring that learners achieve national certification prior to working in that state. Students who complete this program are encouraged to complete the practical/clinical externship option with their program. This comprehensive program is designed to prepare students to sit for AWS SENSE Entry Level Welder Certificate of Completion exam(s). Students who complete this program can and do sit for the AWS SENSE Entry Level Welder Certificate of Completion national certification exam(s) and are qualified, eligible and prepared to do so.

Externship / Hands on Training / Practicum

Although not a requirement, once students complete the program, they have the ability to participate in an externship and/or hands on practicum so as to practice the skills necessary to perform the job requirements of a professional in this field. Students will be assisted with completing a resume and/or other requirements necessary to work in this field. All students who complete this program are eligible to participate in an externship and will be placed with a participating organization near their location. The institution works with national organizations and has the ability to place students in externship opportunities nationwide.

Clemson University contact: If students have any questions regarding this program including national certification and externships **, they should call Salley Ouellette of Clemson University at | (864) 656-2200 or via email at palmer4@clemson.edu**

Note : No refunds can be issued after the start date published in your Financial Award document.

About Clemson University!

Clemson Online, a unit reporting directly to the Provost, works closely with leadership teams across the University to develop, market, and deliver top-quality courses and programs in blended and online formats. The office provides vision, leadership, coordination, and expertise in support of faculty design, delivery, and evaluation of technology-enhanced, blended, and fully online courses and instructional materials. Dynamic, transformative, and unique eLearning opportunities characterize Clemson's approach to online teaching and learning.

Our Mission: Clemson Online provides strategic leadership for online education, emphasizing innovative teaching and superior learning outcomes to maximize student success in 21st-century academic and professional contexts.

Our Vision: Clemson Online will define the public web-grant university through measurable achievements in online education, research, and service. The office is committed to pursuing strategic opportunities, providing supportive resources, promoting superior educational quality, and ensuring faculty involvement and responsibility in shaping Clemson's online future.

Clemson University and Pearson Education

Clemson University's eLearning programs were developed in partnership with Pearson Education to produce the highest quality, best-in-class content and delivery necessary to enhance the overall student learning experience, boost understanding and ensure retention. Pearson Education is the premier content and learning company in North America offering solutions to the higher education and career training divisions of colleges and universities across the country aimed at driving quality education programs to ensure student success. Please visit us at **www.pearson.com** .

About Pearson Education

Welcome to Pearson. We have a simple mission: to help people make more of their lives through learning. We are the world's leading learning company, with 40,000 employees in more than 80 countries helping people of all ages to make measurable progress in their lives. We provide a range of education products and services to institutions, governments and direct to individual learners, that help people everywhere aim higher and fulfil their true potential. Our commitment to them requires a holistic approach to education. It begins by using research to understand what sort of learning works best, it continues by bringing together people and organizations to develop ideas, and it comes back round by measuring the outcomes of our products.

Core Trades Curriculum Detailed Objectives:

AN ORIENTATION TO BUILDING TRADES

- Describe the building trades industry.
- Explain the concept of green building.
- Describe a residential and commercial construction site.
- Identify various career options within the building trades.
- Identify the required professional skills in the building trades industry

SAFETY IN BUILDING TRADES

- Explain why safety is important in the workplace, the causes of incidents and accidents, the associated costs, and the process of hazard recognition and control, including HAZCOM and SDSs.
- Explain requirements for working safely in elevated working using ladders, stairs, and scaffolds, including fall prevention, arrest, and protection guidelines
- Explain struck-by hazards and caught-in-between, including how to avoid them
- Explain energy-related hazards, including how to avoid them and lockout/tagout procedures
- Explain proper use of personal protective equipment used in construction worksites
- Explain specific job-site safety hazards including exposure hazards, environmental extremes, hot work and firefighting procedures, and confined spaces.

MATH AND MEASUREMENT IN BUILDING TRADES

- Use whole numbers in basic math problems related tasks in the trades
- Use various tools to make accurate linear measurements
- Use fractions in basic math problems related tasks in the trades
- Use decimals in basic math problems related to tasks in the trades
- Convert units of length, weight, volume, and temperature between the U.S. customary scale and the metric system
- Apply basic geometry concepts to trade-related problems
- Calculate area and volume of two-dimensional and three-dimensional shapes
- Perform basic business math problems related to the trades
- Correctly solve trades-related math problems

HAND TOOLS – SAFETY, USE, AND CARE

- Explain and apply general and tool safety, care, and storage practices.
- Identify and explain how to use various types of measurement and layout tools.
- Identify and explain how to use a variety of hammers and nail pullers.
- Identify and explain how to use various types of pliers, screwdrivers, and wrenches.
- Identify and explain how to use various cutting tools.
- Identify and explain how to use various digging tools.
- Identify and explain how to use various holding, securing, and moving tools.
- Identify and explain how to use various fitting tools.
- Explain procedures and concepts related to handling materials safely.
- Identify and explain the use of non-motorized material handling equipment.

POWER TOOLS – SAFETY, USE, AND CARE

- Identify and explain how to use selected power tools.
- Identify and explain how to use various types of power saws.
- Identify and explain how to use various types grinder and grinder attachments
- Identify and explain how to use a variety of other selected power tools.

FASTENERS, ADHESIVES, AND SEALANTS

- Select the appropriate fastener type and size for common construction jobs.
- Explain how to use common fastener types correctly.
- Describe different types and uses of common adhesives.
- Describe common sealants and their uses.

RIGGING EQUIPMENT AND CONCEPTS

- Identify and describe the types of rigging equipment
- Explain how to inspect common rigging equipment for safety
- Use the Emergency Stop hand signal.

INTRODUCTION TO DRAWINGS AND PLANS

- Identify the types of construction drawings, including their fundamental components and features.
- Properly an engineer's and architect's scale.

Welding Technician Module Detailed Program Objectives

INTRODUCTION TO WELDING

- Explain the welding industry and various career options
- Define welding terms and acronyms
- Describe the main welding processes and techniques
- Identify the important professional skills required for welders in the workplace and in a welding career

WELDING SAFETY

- Identify the type of injuries that can occur in welding environments and jobs
- Identify the personal protective equipment used in welding activities and explain its proper use
- Describe the ventilation needs in welding and environment and related ventilation equipment
- Explain the use of Safety Data Sheets (SDSs)
- Explain the safe handling, storing, securing, and use of gas cylinders
- Discuss the fire protection procedures and equipment used in welding environments
- Discuss the equipment maintenance tasks required in welding environments
- Identify the safety considerations related to portable equipment
- Identify the safety considerations related to hand and power tools
- Explain the safe and proper lifting and lowering of heavy items
- Identify the common general safety procedures in a welding shop including incident documentation

FLAME CUTTING

- Define oxyfuel gas cutting (OFC) including uses, fuels, metals
- Describe each piece of equipment and component used in OFC
- Describe equipment care and maintenance for regulator, torch, cylinders, hoses, fittings
- Explain how to setup and operate OFC equipment
- Explain OFC for specific cuts
- Describe use of mechanized equipment

PLASMA ARC CUTTING

- Define the plasma arc cutting process and its advantages and disadvantages
- Explain how the plasma arc cutting equipment works
- Explain how to setup and operate plasma arc cutting equipment
- Discuss the safety procedures related to plasma arc cutting

OTHER CUTTING PROCESSES

- Explain laser-beam cutting (LBC)
- Explain laser-beam drilling (LBD)
- Explain oxygen lance cutting
- Explain water jet cutting
- Explain air-carbon arc cutting and gouging

WELDING SPECIMEN PREPARATION AND WELD TYPES

- Define some basic metallurgy concepts related to welding and cutting
- Describe the properties of steel
- Identify the different types of welds
- Define the different welding positions
- Explain concepts related to joint design as they relate to welding
- Discuss welding codes and specifications
- Explain the steps in cleaning base metal for welding using mechanical means and chemical processes
- Describe how to prepare a welding joint for welding. using mechanical and thermal means
- Review welding safety

WELDING TESTING AND INSPECTION

- Explain purpose and source of welding codes and standards
- Describe and identify common welding discontinuities including causes and preventive measures
- Describe common nondestructive examinations for welds
- Describe common destructive examinations for welds
- Distinguish between welder procedure qualification, welder performance qualification, welding operator qualification

WELDING DRAWING

- Identify the major components and markings of welding detail drawings
- Interpret welding symbols
- Interpret sizing and dimensioning of various welds

SMAW EQUIPMENT SETUP AND OPERATION

- Explain the safety considerations and hazards related to SMAW welding and the welding environment
- Explain the current flow in SMAW welding equipment
- Identify SMAW welding equipment, its components, and related tools
- Explain the steps for setting up SMAW equipment
- Describe the steps to properly starting and stopping SMAW equipment
- Describe the proper storage procedures for SMAW equipment
- Describe the proper maintenance tasks for SMAW equipment

SHIELDED METAL ARC WELDING (SMAW)

Bead and Fillet Welds

- Explain the safety practices required for shielded metal arc welding
- Explain the steps required for preparing the work space and associated areas for shielded metal arc welding
- Explain how to strike an arc and adjust the arc blow
- Explain how to safely restart and terminate a weld pass
- Explain the proper technique for producing a stringer bead
- Explain the proper technique for producing a weave bead
- Explain the proper technique for producing an overlapping bead
- Explain the proper technique required to produce fillet weld in all positions

Groove Welds with Backing

- Identify the different type of groove welds
- Describe how to prepare for groove welding
- Explain how to produce grove welds in 1G, 2G, 3G, and 4G positions

Open-Root Grove Welds – Pate

- Explain how to produce open V-groove welds in 1G, 2G, 3G, and 4G positions

JOINT FIT-UP & ALIGNMENT

- Describe measuring devices used in welding
- Describe fit-up gauges used in welding
- Describe weldment positioning equipment
- Describe plate alignment tools
- Describe pipe and flange alignment tools
- Define weldment distortion and how to control it

MICROSOFT OFFICE

- Module Use an integrated software package, specifically the applications included in the Microsoft Office suite
- Demonstrate marketable skills for enhanced employment opportunities
- Describe proper computer techniques for designing and producing various types of documents
- Demonstrate the common commands & techniques used in Windows desktop
- List the meaning of basic PC acronyms like MHz, MB, KB, HD and RAM
- Use WordPad and MSWord to create various types of documents
- Create headings and titles with Word Art
- Create and format spreadsheets, including the use of mathematical formulas
- Demonstrate a working knowledge of computer database functions, including putting, processing, querying and outputting data
- Define computer terminology in definition matching quizzes
- Use the Windows Paint program to alter graphics
- Use a presentation application to create a presentation with both text and graphics
- Copy data from one MS Office application to another application in the suite
- Use e-mail and the Internet to send Word and Excel file attachments
- Demonstrate how to use the Windows Taskbar and Windows Tooltips
- Explain how copyright laws pertain to data and graphics posted on the Internet
- Take the college computer competency test after course completion
- Follow oral and written directions and complete assignments when working under time limitations

Note: Although the Microsoft Office Module is not required to successfully complete this program, students interested in pursuing free Microsoft MOS certification may want to consider completing this Microsoft Office Module at no additional cost.

System Requirements:

Windows Users:

- Windows 8, 7, XP or Vista
- 56K modem or higher
- Soundcard & Speakers
- Firefox, Chrome or Microsoft Internet Explorer

Mac OS User:

- Mac OS X or higher (in classic mode)
- 56K modem or higher
- Soundcard & Speakers
- Apple Safari

iPad Users:

- Due to Flash limitations, eLearning programs are NOT compatible with iPads

Screen Resolution:

- We recommend setting your screen resolution to 1024 x 768 pixels.

Browser Requirements:

- System will support the two latest releases of each browser. When using older versions of a browser, users risk running into problems with the course software.
- Windows Users: Mozilla Firefox, Google Chrome, Microsoft Internet Explorer
- Mac OS Users: Safari, Google Chrome, Mozilla Firefox

Suggested Plug-ins:

- Flash Player
- Real Player
- Adobe Reader
- Java