**WELDING FUNDAMENTAL**

**WELDING FUNDAMENTAL I**

**🔹 Course 1: Welding Principles, Safety & Oxyfuel Operations**

**Modules Included:** 1–6, 23, 24, 25  
**Course Fee:** $

**Overview**

The AWS Welding Fundamentals Course provides a comprehensive overview of the basic principles of welding. Participants will learn the basic science and practical application of the most commonly utilized welding processes along with other essential topics, including welding terminology, weld design, welding safety, electrical theory, the weldability of metals, and welding quality control. Presented in short, easy-to-understand modules, this multimedia, online course is ideal for both students and professionals who want to expand their core competencies.

**What You’ll Learn**

* Understand the definition, importance, and applications of welding
* Identify various welding processes and weld types
* Recognize welding hazards and implement safety measures
* Apply environmental protection and hazard management techniques
* Operate oxyfuel welding and cutting systems safely
* Identify advantages, disadvantages, and maintenance of oxyfuel equipment

**Syllabus**

| **Module** | **Title** | **Key Focus** |
| --- | --- | --- |
| 1 | What is Welding? | Introduction to welding and its industrial importance. |
| 2 | Welding Processes and Weld Types | Overview of welding categories and joint configurations. |
| 3 | Welding Hazards and Environmental Protection | Workplace hazards, fume control, and safe practices. |
| 4 | Managing Hazards and Accident Prevention | Risk assessment, PPE, and first aid awareness. |
| 5 | Oxyfuel Welding: Basics of Combustion, Fuel Types, and Flame Characteristics | Science of oxyfuel combustion and flame adjustment. |
| 6 | Oxyfuel Welding: Advantages, Disadvantages, and Equipment | Equipment setup and system maintenance. |
| 23 | Oxyfuel Cutting Basics and Equipment | Cutting principles and setup procedures. |
| 24 | Oxyfuel Cutting Flame Types, Gas Types, and Cutting Variables | Flame characteristics and cutting optimization. |
| 25 | Oxyfuel Cutting Quality Limitations and Safety | Troubleshooting, limitations, and operator safety. |

**Certification & Exam**

* **Certification:**  *Certificate in Welding Safety & Oxyfuel Operations*

**Sample Quiz**

1. What is the primary purpose of shielding gas in oxyfuel welding?  
   a) To stabilize the flame b) To cool the torch c) To provide oxygen d) None of the above
2. Which gas combination is most commonly used in oxyfuel welding?  
   a) Oxygen and acetylene b) Nitrogen and hydrogen c) Argon and helium d) Oxygen and carbon dioxide
3. What PPE is essential for oxyfuel welding?  
   a) Welding helmet b) Fire-resistant gloves c) Apron d) All of the above

**FAQ**

**Q1:** Is this course suitable for beginners?  
**A:** Yes, it’s designed for newcomers to welding and safety.

**Q2:** How long is the training?  
**A:** 6–8 weeks on average.

**Q3:** Is practical training included?  
**A:** Yes, learners perform live oxyfuel operations.

**🔹 Course 2: Arc Welding Processes & Techniques**

**Modules Included:** 7–18  
**Course Fee:** $

**Overview**

This course explores **arc welding methods** including Shielded Metal Arc Welding (SMAW), Gas Tungsten Arc Welding (GTAW), Gas Metal Arc Welding (GMAW), Flux-Cored Arc Welding (FCAW), and Submerged Arc Welding (SAW). It focuses on the **principles, equipment setup, and process control** of each technique.

**What You’ll Learn**

* Understand arc welding principles and electrical fundamentals
* Operate various arc welding machines and power sources
* Select correct electrodes, shielding gases, and materials
* Master SMAW, GTAW, GMAW, FCAW, and SAW welding methods
* Control welding variables to ensure quality and consistency

**Syllabus**

| **Module** | **Title** | **Key Focus** |
| --- | --- | --- |
| 7 | The Science of Arc Welding: Basics of Electricity | Electrical principles and current flow. |
| 8 | The Science of Arc Welding: Electrical Polarity and Equipment | Machine setup and polarity effects. |
| 9 | Shielded Metal Arc Welding: Process Characteristics and Electrodes | SMAW principles and consumable selection. |
| 10 | Shielded Metal Arc Welding: Operations, Equipment, and Process Variables | Machine handling and arc control. |
| 11 | Gas Tungsten Arc Welding: Principles, Operations, and Equipment | GTAW fundamentals and torch handling. |
| 12 | Gas Tungsten Arc Welding: Shielding Gases, and Process Variables | Gas selection and weld quality optimization. |
| 13 | Gas Metal Arc Welding: Principles, Equipment, and Metal Transfer Modes | GMAW fundamentals and transfer types. |
| 14 | Gas Metal Arc Welding: Consumables, Shielding Gases, Equipment, and Process Variables | Gas mixes, electrodes, and variable control. |
| 15 | Flux Cored Arc Welding: Principles, Equipment, and Consumables | FCAW applications and wire selection. |
| 16 | Flux Cored Arc Welding: Shielding Gases, Equipment, and Process Variables | Process tuning and performance. |
| 17 | Submerged Arc Welding: Principles, Equipment, and Materials | SAW fundamentals and consumable types. |
| 18 | Submerged Arc Welding: Electrodes, Flux, Equipment, and Process Variables | Quality control and parameter settings. |

**Certification & Exam**

* **Certification:**  *Certificate in Arc Welding Processes*
* **Assessment:** Written theory + hands-on welding demonstration
* **Passing Score:** 75%
* **Mode:** Practical and theory hybrid

**Sample Quiz**

1. Which welding process uses a continuously fed wire?  
   a) SMAW b) GMAW c) GTAW d) FCAW
2. What type of current is used for GTAW on aluminum?  
   a) AC b) DCEN c) DCEP d) None
3. What is the main advantage of submerged arc welding?  
   a) Low smoke and high deposition rate b) Portability c) Simple setup d) No shielding gas needed

**FAQ**

**Q1:** Do I need to complete Welding Fundamentals 1 first?  
**A:** Recommended but not mandatory.

**Q2:** Is this course hands-on?  
**A:** Yes, with live welding practice on multiple processes.

**Q3:** Can I specialize in one process after completion?  
**A:** Yes, you can choose advanced SMAW, GMAW, or GTAW specialization modules.

**🔹 Course 3: Welding Metallurgy, Quality & Cutting Technologies**

**Modules Included:** 19–29  
**Course Fee:** $

**Overview**

This course focuses on **metal science, weld quality, and cutting processes**. Learners explore the metallurgical effects of heat, structural discontinuities, and precision cutting using carbon arc and plasma arc systems.

**What You’ll Learn**

* Understand metal structures and behavior during welding
* Identify discontinuities and their root causes
* Apply principles of welding metallurgy and heat effects
* Perform cutting using carbon arc and plasma arc techniques
* Maintain high-quality welding and cutting standards

**Syllabus**

| **Module** | **Title** | **Key Focus** |
| --- | --- | --- |
| 19 | Basics of Welding Metallurgy: Atomic Structures and Properties of Metals | Understanding metal characteristics. |
| 20 | Basics of Welding Metallurgy: States of Matter, Alloys, and Heat Affected Zones | Effects of heat and alloy composition. |
| 21 | Welding Discontinuities and Their Causes: Process, Metallurgical, and Base Metal Discontinuities | Common weld defects and corrections. |
| 22 | Welding Discontinuities and Their Causes: Structural Discontinuities | Structural irregularities and inspection. |
| 26 | Carbon Arc Cutting Basics and Equipment | Carbon arc cutting principles. |
| 27 | Carbon Arc Cutting Operating Procedures & Safety | Step-by-step cutting techniques and safety. |
| 28 | Plasma Arc Cutting Basics and Equipment | Equipment and plasma formation. |
| 29 | Plasma Arc Cutting Variables, Metallurgical Effects, Secondary Functions, and Safety | Variable control and post-cut quality. |

**Certification & Exam**

* **Certification:**  *Certificate in Welding Metallurgy & Cutting Technology*
* **Assessment:** Written test, defect inspection task, and cutting practical
* **Passing Score:** 70%
* **Mode:** In-person or hybrid

**Sample Quiz**

1. What is the heat-affected zone (HAZ)?  
   a) Area of base metal altered by heat b) Weld metal region c) Filler metal zone d) None
2. What type of current is used in plasma arc cutting?  
   a) DC b) AC c) Either d) None
3. Which defect is caused by improper shielding gas flow?  
   a) Porosity b) Undercut c) Burn-through d) Crater crack

**FAQ**

**Q1:** Is metallurgy necessary for welders?  
**A:** Yes, it’s vital for understanding material behavior and weld integrity.

**Q2:** Are cutting tools provided?  
**A:** Yes, all cutting and safety equipment are available during practical sessions.

**Q3:** Can I continue to Welding Fundamentals 2 after this?  
**A:** Yes, this course serves as a bridge to advanced technologies.

**Welding fundamental II**

**🔹 Course 1: Advanced Resistance Welding Technology**

**Modules Included:** 1–7  
**Course Fee:** **$**

**Overview**

The AWS Welding Fundamentals II Course provides a comprehensive overview of resistance welding, plasma arc welding, electron beam welding, and laser beam welding, cutting, and drilling. Participants will learn about the science, equipment, consumables, process variables, safety precautions, and advantages and disadvantages inherent to each process.

**What You’ll Learn**

* Understand the science behind resistance welding
* Identify and operate resistance welding equipment
* Select proper materials and consumables for high-quality welds
* Control process variables for consistent weld performance
* Apply safety principles during welding operations
* Perform spot, projection, and seam welding techniques effectively
* Evaluate process advantages and limitations

**Syllabus**

| **Module** | **Title** | **Key Focus** |
| --- | --- | --- |
| 1 | Resistance Welding I: History & Science | Origins, principles, and industrial evolution of resistance welding. |
| 2 | Resistance Welding II: Equipment | Overview of machines, electrodes, and control systems. |
| 3 | Resistance Welding III: Consumables & Materials | Material compatibility and electrode selection. |
| 4 | Resistance Welding IV: Variables | Process parameters and control of weld quality. |
| 5 | Resistance Welding V: Safety | Safety protocols and protective equipment. |
| 6 | Resistance Welding VI: Spot & Projection Welding | Practical applications in manufacturing and automotive industries. |
| 7 | Resistance Welding VII: Seam Welding & Advantages/Disadvantages | Comparative insights, performance, and limitations. |

**Certification & Exam**

* **Certification:** *l Certificate in Advanced Resistance Welding Technology*
* **Assessment:** Multiple-choice test, practical project evaluation, and safety compliance checklist.
* **Passing Score:** 70% minimum.
* **Mode:** Online or in-person evaluation.

**Sample Quiz**

1. What is the primary heat source in resistance welding?  
   a) Arc flame  
   b) Electric resistance through metal  
   c) Laser beam  
   d) Plasma discharge
2. Which factor directly influences nugget formation in spot welding?  
   a) Welding current  
   b) Gas flow rate  
   c) Wire feed speed  
   d) Coating thickness
3. What type of electrode is commonly used in resistance welding?  
   a) Tungsten  
   b) Copper alloy  
   c) Carbon  
   d) Steel

**FAQ**

**Q1:** Do I need prior welding experience?  
**A:** No, this course is designed for both beginners and professionals.

**Q2:** How long does the training last?  
**A:** Approximately 8–10 weeks depending on learning pace.

**Q3:** Is the certification internationally recognized?  
**A:** Yes. Certificates are recognized across multiple industrial sectors.

**Q4:** Can the course be taken online?  
**A:** Yes, with both theory and simulation options available.

**🔹 Course 2: Precision Beam & Plasma Welding Processes**

**Modules Included:** 8-21  
**Course Fee:** $

**Overview**

This course explores advanced welding technologies including **Plasma Arc Welding, Electron Beam Welding, and Laser Beam Welding**. It focuses on the science, equipment, and control variables that define high-precision welding used in aerospace, electronics, and energy sectors.

**What You’ll Learn**

* Understand plasma, electron beam, and laser welding principles
* Operate advanced welding machines safely and effectively
* Manage key process parameters for consistent quality
* Identify material behavior under high-energy welding
* Apply safety measures for high-intensity beam processes
* Compare performance, advantages, and limitations of each process

**Syllabus**

| **Module** | **Title** | **Key Focus** |
| --- | --- | --- |
| 8 | Plasma Arc Welding I: History, Science & Equipment | Introduction to plasma arc welding and machinery. |
| 9 | Plasma Arc Welding II: Variables & Advantages/Disadvantages | Process optimization and comparative benefits. |
| 10 | Electron Beam Welding I: History & Science I | Fundamentals of electron beam welding and energy focus. |
| 11 | Electron Beam Welding II: Science II | Deeper understanding of process physics. |
| 12 | Electron Beam Welding III: Equipment I | Structure and operation of EBW systems. |
| 13 | Electron Beam Welding IV: Equipment II | Control systems, maintenance, and precision handling. |
| 14 | Electron Beam Welding V: Variables & Safety | Key parameters and radiation safety considerations. |
| 15 | Electron Beam Welding VI: Advantages & Disadvantages | Process strengths and limitations. |
| 16 | Laser Beam Processes I: History & Science | Evolution and principles of laser welding. |
| 17 | Laser Beam Processes II: Equipment, Consumables & Materials | Setup, components, and material interaction. |
| 18 | Laser Beam Processes III: Cutting & Drilling | Techniques for precision cutting and drilling. |
| 19 | Laser Beam Processes IV: Variables | Control of beam power, focus, and travel speed. |
| 20 | Laser Beam Processes V: Safety | Laser handling and safety management. |
| 21 | Laser Beam Processes VI: Advantages & Disadvantages | Comparative analysis of process efficiency and scope. |

**Certification & Exam**

* **Certification:** *Certificate in Precision Beam & Plasma Welding Processes*
* **Assessment:** Written quiz, digital simulation, and practical evaluation.
* **Passing Score:** 75% minimum.

**Sample Quiz**

1. Which gas is typically used in plasma arc welding?  
   a) Argon  
   b) Oxygen  
   c) Nitrogen  
   d) Carbon dioxide
2. What is the main safety concern in laser beam welding?  
   a) Radiation exposure  
   b) Gas leakage  
   c) Electrode erosion  
   d) Arc flash
3. Electron beam welding requires operation under what condition?  
   a) High pressure  
   b) Vacuum  
   c) Open air  
   d) Underwater

**FAQ**

**Q1:** Can I enroll directly in this course?  
**A:** Yes, though prior welding fundamentals are recommended.

**Q2:** What equipment will I use during training?  
**A:** Plasma welding units, laser welding simulators, and beam control systems.

**Q3:** Are safety certifications included?  
**A:** Yes, all participants complete a beam safety training module.

**Q4:** Can I continue to advanced modules after certification?  
**A:** Yes, the course qualifies you for *Advanced Welding Automation and Robotics*.

**WELDING FUNDAMENTAL III**

**🔹 Course 1: Professional Brazing Technology**

**Modules Included:** 1–8  
**Course Fee:** $

**Overview**

The AWS Welding Fundamentals III Course, participants learn the basic science and practical application of the most utilized brazing and soldering processes. These processes include torch, furnace, dip, and induction brazing, as well as iron, torch, furnace, dip, and wave soldering. Presented in short, easy-to-understand modules, this multimedia course covers the science, equipment, consumables, process variables, safety precautions, and advantages and disadvantages inherent to each process.

**What You’ll Learn**

* Principles and history of brazing
* Equipment setup and maintenance
* Process variations and applications
* Selection of filler metals and base materials
* Control of process variables
* Safety standards and operational efficiency

**Syllabus**

| **Module** | **Title** | **Key Focus** |
| --- | --- | --- |
| 1 | Brazing: Introduction | Fundamentals and industrial use cases |
| 2 | Brazing: Equipment | Torches, fluxes, and heating systems |
| 3 | Brazing: Process Variations | Furnace, torch, induction, and dip brazing |
| 4 | Brazing: Materials 1 | Base metals and filler metal compatibility |
| 5 | Brazing: Materials 2 | Joint design and capillary action |
| 6 | Brazing: Materials 3 | Fluxes and atmospheres |
| 7 | Brazing: Variables | Temperature, time, and clearances |
| 8 | Brazing: Safety & Advantages/Disadvantages | Workplace safety and performance review |

**Certification & Exam**

Participants will receive a **Certificate of Completion in Brazing Technology** after passing a practical and theoretical assessment.

**Exam Format:**

* 40% Written Exam (Multiple Choice)
* 60% Practical Assessment (Joint Preparation & Brazing)

**Sample Quiz**

1. What is the key difference between brazing and welding?
2. Name two common brazing filler metals.
3. Why is flux important in brazing?
4. List two advantages of brazing over fusion welding.

**FAQ**

**Q:** Do I need previous welding experience?  
**A:** Basic welding knowledge helps, but full guidance is provided.

**Q:** Is equipment provided for practice?  
**A:** Yes, all materials and tools are supplied during training.

**🔹 Course 2: Precision Soldering and Low-Temperature Joining**

**Modules Included:** 9–15  
**Course Fee:** $

**Overview**

This course focuses on soldering as a precision joining process used in electronics, plumbing, and fine metal fabrication. Participants explore materials, fluxes, process variations, and quality assurance in soldering.

**What You’ll Learn**

* Introduction to soldering principles
* Equipment and material selection
* Soldering process variations
* Flux applications and control
* Process variables and heat management
* Safety measures and defect prevention

**Syllabus**

| **Module** | **Title** | **Key Focus** |
| --- | --- | --- |
| 9 | Soldering: Introduction | Fundamentals of soldering and its uses |
| 10 | Soldering: Equipment | Irons, torches, and temperature control |
| 11 | Soldering: Process Variations | Wave, reflow, and hand soldering |
| 12 | Soldering: Materials 1 | Solders, fluxes, and base materials |
| 13 | Soldering: Materials 2 | Alloys and melting ranges |
| 14 | Soldering: Variables | Time, temperature, and cleanliness |
| 15 | Soldering: Safety & Advantages/Disadvantages | Handling, ventilation, and efficiency |

**Certification & Exam**

Participants receive a **Certificate in Soldering & Low-Temperature Joining** after successful assessment.

**Exam Format:**

* 50% Written Test
* 50% Practical Soldering Project

**Sample Quiz**

1. What is the typical melting point range for solder alloys?
2. What is the purpose of flux in soldering?
3. Mention two soldering process variations.
4. What are the main safety precautions during soldering?

**FAQ**

**Q:** Can this course help in electronics repair work?  
**A:** Yes, it’s ideal for electrical and electronic applications.

**Q:** How long does the course last?  
**A:** 10 days on learning pace.