



**COFFEE
TECHNICIANS**
PROGRAM

COURSE CATALOG

Specialty Coffee Association

SCA Certificate Programs

SCA offers certificates in the following education programs: the Coffee Skills Program, the Coffee Sustainability Program, and the Coffee Technicians Program. These programs are built on decades of knowledge, research, and real-world experience and are designed to help learners create a successful career in the coffee industry. SCA staff work collaboratively with subject matter experts to develop and maintain the course materials and exams of these programs.

The Coffee Technicians Program

Dependable, fully functioning equipment is critical at every step of the specialty coffee supply chain. The Coffee Technicians Program (CTechP) is designed for those who wish to develop their abilities to install, maintain, and repair espresso machines, batch brewers, grinders, and water treatment systems.

Program and Courses

There are six courses in the Coffee Technicians Program: three Foundation courses, two Intermediate courses, and one Professional course. Learners choose which courses are most appropriate for their educational needs.

The Foundation courses of the program are Electrical, Hydraulics, and Water & Preventive Maintenance, which speak to the electromechanical nature of coffee machines and the considerations that keep them running efficiently. The Intermediate courses – Intermediate Diagnostics & Repair and Intermediate Water Treatment – deepen learners' understanding of equipment installation and maintenance while providing hands-on practice with common measurement, repair, and troubleshooting tasks. The Professional course – Advanced Equipment Support – helps learners synthesize their technical knowledge and experience to create preventative maintenance plans and inventory strategies, provide equipment recommendations to customers, navigate complex equipment repairs, and more.

Each course promotes a culture of safety and learners are assessed for competency through both a written and practical exam. Upon passing these exams, a learner will receive a certificate confirming their successful completion of the course. Certificate holders will have the ability to demonstrate their ongoing professional development through courses designed by the world's specialty coffee authority and leading industry experts.

Because this is a skills-based program with a practical exam, all courses will require some form of in-person instruction and assessment. Some instructors deliver theoretical knowledge and lectures online, followed by in-person activities and the practical exam. Other instructors deliver the entire course in person. You can expect Foundation courses to be the equivalent of a two-day session, with Intermediate and Professional courses ranging from the equivalent of two to four days each.



Electrical

Explore how to safely navigate coffee equipment electronics, including how to identify, remove, and replace electrical components in coffee machines; how to accurately communicate the power supply needs for a coffee machine to an electrician; and how to connect machines to a power supply.

Description – Electrical Foundation

Electrical Foundation introduces learners to coffee machine electrical systems and the practical skills required to safely work with electrical equipment. At the end of the course, learners will be able to identify and state the purpose of electrical components found in coffee equipment; describe how various coffee machine electrical circuits operate; describe the fundamental operating characteristics of electricity in its various configurations; describe the dangers associated with interacting with electrical equipment and demonstrate appropriate safety procedures; use electrical testing tools to measure voltage, continuity, and resistance; and properly connect machines to a power supply.

Required Prerequisites	None	Recommended Prerequisites	None	Delivery Method	In-person learning or a combination of in-person and distance learning	Minimum Length	9 hrs	Required Exams Passing Scores	Written exam 70% Practical exam 70%
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Hydraulics

Practice locating, troubleshooting, and replacing hydraulic components in coffee equipment, as well as routing and connecting water supply lines to coffee machines.

Description – Hydraulics Foundation

Hydraulics Foundation introduces learners to coffee machine hydraulics and the practical skills required to connect a coffee machine to a water supply. At the end of the course, learners will be able to recognize various hydraulic circuits and components in espresso machines and batch brewers, describe fundamental aspects of hydrodynamics, and utilize various hand tools and plumbing fittings.

Required Prerequisites	None	Recommended Prerequisites	None	Delivery Method	In-person learning or a combination of in-person and distance learning	Minimum Length	7 hrs	Required Exams Passing Scores	Written exam 70% Practical exam 70%
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Water & Preventive Maintenance

Analyze and resolve water quality issues and conduct preventive maintenance procedures to improve coffee quality and support the long-term health of coffee equipment.

Description– Water & Preventive Maintenance Foundation

Water & Preventive Maintenance Foundation introduces learners to water treatment systems and the preventive maintenance of coffee machines. At the end of the course, the learner will be able to identify the typical components, function, impact, and maintenance of common water treatment systems; define key water parameters and quality recommendations; measure water composition; describe the goals of a preventive maintenance program; identify components in a traditional espresso machine, batch brewer, and coffee grinder that require preventive maintenance, and demonstrate maintenance tasks with the appropriate tools and supplies.

Required Prerequisites	None	Recommended Prerequisites	None	Delivery Method	In-person learning or a combination of in-person and distance learning	Minimum Length	9 hrs	Required Exams Passing Scores	Written exam 70% Practical exam 70%
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COFFEE TECHNICIANS PROGRAM FOUNDATION COURSES TOPIC OVERVIEW		
Electrical Foundation	Hydraulics Foundation	Water & Preventive Maintenance Foundation
WORKPLACE SAFETY PRACTICES Personal Responsibility Corporate & Manufacturing Oversight Clothing & Personal Protection Equipment Reducing Environmental Risks Moving Equipment Applying the Correct Tools Mental Preparedness Safe Workshop Practices Recognizing Food Safety Standards ELECTRICAL COMPONENTS Switches Pressure Switches and Thermostats Heating Elements Solenoid Coils Motors Motor Capacitors Terminal Blocks Relays and Contactors	WORKPLACE SAFETY PRACTICES Personal Responsibility Corporate & Manufacturing Oversight Clothing & Personal Protection Equipment Mental Preparedness Chemical Hazards Fire Hazards Moving Equipment Applying Appropriate Tools Shopkeeping Practices Workstation Practices Respecting Food Safety Standards HYDRAULIC COMPONENTS Espresso Brewing System Components Steam System Components Steam System Safety Components Batch Brewers Hydraulic Components Water Heater Tank Safety Components	WORKPLACE SAFETY PRACTICES Personal Responsibility Corporate & Manufacturing Oversight Clothing & Personal Protection Equipment Reducing Environmental Risks Moving Equipment Applying the Correct Tools Mental Preparedness Safe Workshop Practices Recognizing Food Safety Standards WATER TREATMENT SYSTEM COMPONENTS Sanitary Quick-Change Cartridge System Components Drop-In Cartridge System Components Reverse-Osmosis System Components Tank-Style System Components DEFINING KEY WATER PARAMETERS Water Composition

<p>Liquid Level Probes Control Boards Temperature Probes Flowmeters Keypads and Touch Screens Integrated Load Cell Transformers</p> <p>ELECTRICAL SYSTEMS Heating Element Circuits Espresso Machine Brewing Circuits Espresso Machine Autofill Circuits</p> <p>IN-CIRCUIT SAFETY DEVICES Equipment Grounding Residual Current Devices Safety Interlock Switches Circuit Breakers and Fuses Thermal Cutoff Switches and Thermal Fuses Disconnect Switches</p> <p>ELECTRICAL THEORY The Electrical Circuit Voltage Electric Current Resistance Electrical Power Ohm's Law Watt's Law Direct Current Alternating Current Alternating Current Single-Phase Alternating Current Three-Phase</p> <p>ELECTRICAL SAFETY PRACTICES Isolating a Machine from its Power Source Lockout/Tagout Practices and Procedures Working on Live Equipment Safety Checks After Completion of Service</p> <p>ELECTRICAL TESTING DEVICES Pre-Testing Safety Procedures Digital Multimeter Components Digital Multimeter Functions Using a Digital Multimeter AC Current Clamp</p> <p>CONDUCTORS & CONNECTIONS Electrical Wire Components</p>	<p>HYDRAULIC SYSTEMS Brew Water System in Heat Exchanger Espresso Machine Brew Water System in Multi Boiler Espresso Machines Steam System in Espresso Machines Hydraulic Systems of Batch Brewers Hydraulic Symbols for Schematics</p> <p>HYDRODYNAMICS Specific Water Volume in Liquid & Solid Phases Types of Water Pressure Potential Risks of Water Expansion Pressure Specific Volume and Pressure of Steam Potential Risks of Steam Potential Risks of Vacuum Generation Common Pump & Boiler Pressure Settings Common Operating Temperatures Steam Boiler Pressure and Brewing Temperature Relationship Diagnostic Tools</p> <p>HAND TOOLS, TUBING AND FITTINGS Application of Common Hand Tools Hydraulic Tubing & Piping Hydraulic Fittings Gaskets & Sealant Food Safety Considerations</p> <p>CONNECTING TO WATER SUPPLY Data Plate Machine Specification Documents Confirming Supply Line Pressure Confirming Flow Rate Flushing Supply Lines Connection To Supply</p>	<p>Total Hardness and Alkalinity Temporary and Permanent Hardness Total Dissolved Solids Estimation pH Other Substances in Water</p> <p>WATER QUALITY RECOMMENDATIONS SCA Water Recommendations The SCA Water Chart Manufacturer Water Recommendations</p> <p>WATER TREATMENT METHODS Water Treatment Methods Effects of Carbon Filtration Effects of Water Softening Effects of Reverse Osmosis Filtration Effects of Remineralization</p> <p>MEASURING WATER COMPOSITION Water Testing Tools Using an Electrical Conductivity/TDS Meter Using a Drop-Count Titration Kit Using a pH Meter Using Water Testing Strips Using the SCA Water Chart</p> <p>WATER TREATMENT SYSTEM MAINTENANCE Maintenance Requirements Maintaining a Cartridge System Maintaining a Drop-In Cartridge System</p> <p>PREVENTIVE MAINTENANCE COMPONENTS Espresso Machine Brewing Group Components Espresso Machine Steam Valve Components Espresso Machine Steam Boiler Components Batch Brewer Components Coffee Grinder Components</p> <p>MAINTENANCE STRATEGIES Preventive versus Reactive Maintenance Recommended Maintenance Intervals</p> <p>PREVENTIVE MAINTENANCE TOOLS AND SUPPLIES Recommended Hand Tools Recommended Consumables</p> <p>PERFORMING MAINTENANCE Safety During a PM Service</p>
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Electrical Wire Ratings Electrical Wire Terminals Electrical Cable Anatomy Electrical Plugs and Outlets Hard Wired Connections CONNECTION TO ELECTRICAL SERVICE The Data Plate Application of Common Hand Tools Verification of Power Cord and Plug Verification of Power Supply Additional Steps Before Connection		Preventive Maintenance Checklist Espresso Machine PM Cleaning Steps Espresso Machine PM Parts Replacement Espresso Machine PM Inspection Steps Batch Brew Preventive Maintenance Espresso Grinder Preventive Maintenance
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Intermediate Diagnostics & Repair

Apply knowledge of key coffee equipment systems and circuits to troubleshoot, diagnose, and repair equipment issues.

Description – Intermediate Diagnostics & Repair

Intermediate Diagnostics & Repair builds on the knowledge of coffee equipment parts and proper system function introduced in the Hydraulics Foundation and Electrical Foundation courses. It introduces the knowledge and skills necessary to identify symptoms of common coffee equipment malfunctions, perform simple troubleshooting to diagnose their causes, complete common repairs safely and effectively, and adjust key coffee equipment operating parameters.

Required Prerequisites	Hydraulics Foundation, Electrical Foundation	Recommended Prerequisites	Water & PM Foundation	Delivery Method	In-person learning or a combination of in-person and distance learning	Minimum Length	32 hrs	Required Exams Passing Scores	Written exam 70% Practical exam 75%
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Intermediate Water Treatment

Dive more deeply into water treatment systems and fine-tuning water parameters for various types of coffee equipment.

Description – Intermediate Water Treatment

Intermediate Water Treatment builds on the knowledge of water chemistry, risks to coffee equipment, and simple treatment methods introduced in the Water & Preventive Maintenance Foundation course. In IWT, learners will deepen their understanding of water treatment system components and processing capacities, principles of limescale buildup and corrosion risk, and system requirements for various coffee equipment types. Hands-on activities include the assembly, installation, adjustment, and maintenance of water treatment systems and the use of various measurement devices and techniques.

Required Prerequisites	Water & PM Foundation	Recommended Prerequisites	Hydraulics Foundation, Electrical Foundation	Delivery Method	In-person learning or a combination of in-person and distance learning	Minimum Length	16 hrs	Required Exams Passing Scores	Written exam 70% Practical exam 75%
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COFFEE TECHNICIANS PROGRAM INTERMEDIATE COURSES TOPIC OVERVIEW

Intermediate Diagnostics & Repair	Intermediate Water Treatment
<p>SAFE PRACTICES FOR REPAIRING COFFEE EQUIPMENT Isolating a Machine from the Power Source Hydraulic Systems Safe Practices Safe Practices for Working with Electrical Equipment Safe Practices While Working Around Sharp Edges Verifying Safe Connection to Electrical Service</p> <p>COFFEE EQUIPMENT SYSTEMS AND CIRCUITS Espresso Machine Systems Coffee Equipment Systems and Circuits Espresso Machine Brewing Systems & Circuits Espresso Machine Steam Systems & Circuits Batch Brewer/Hot Water Dispenser Systems & Circuits Coffee Grinder Systems & Circuits</p> <p>HYDRAULIC COMPONENT FUNCTION AND FAILURE Water Pumps Check/Non-Return Valves Espresso Machine Boilers Heat Exchangers Expansion Valves Two-Way Solenoid Valves Three-Way Solenoid Valves Brew Group Heads Group Jets/Gicleurs Thermosyphon Jets Dip Tubes Mechanical Pressure Gauges Quarter-Turn Ball Valves Needle Valves Boiler Level Sightglass Assemblies Mechanical Steam or Hot Water Valves and Wands Boiler Safety Valves Anti-Vacuum Valves Batch Brewer Spray Heads Batch Brewer Manual Hot Water Spigots</p> <p>ELECTRICAL COMPONENT FUNCTION AND FAILURE Switches Pressure Switches Thermostats and Thermal Cutoff Switches Heating Elements Thermal Fuses</p>	<p>WORKPLACE SAFETY PRACTICES Personal Responsibility Corporate & Manufacturing Oversight Clothing & Personal Protection Equipment Mental Preparedness Chemical Hazards Fire Hazards Moving Equipment Applying Appropriate Tools Shopkeeping Practices Workstation Practices Respecting Food Safety Standards</p> <p>CHEMISTRY OF WATER Anions, Cations, and Charges Hydrogen Ions and pH Calcium and Magnesium Carbonates and Alkalinity Sodium and Potassium Chlorides Sulfates Chlorine and Chloramine Other Substances in Water Electrical Conductivity</p> <p>MEASURING WATER COMPOSITION Water Testing Tools Estimating TDS from Electrical Conductivity Techniques for Improved Water Testing Municipal Water Reports Scheduled Sampling and Testing Programs Conversion of Measurement Units</p> <p>FUNDAMENTALS OF SCALE AND CORROSION Scale and Mineral Deposits Mechanisms of Limescale Buildup Predicting Limescale Risk Corrosion Mechanisms Predicting Corrosion Risk Online and Application-Based Calculators</p> <p>WATER REQUIREMENTS FOR DIFFERENT EQUIPMENT TYPES Water Recommendations Treatment Methods for Different Equipment Types</p>

Circuit Breakers
Fuses and Fuse Holders
Ground Fault Circuit Interrupters/Residual Current Devices
Solenoid Coils
Motors and Motor Capacitors
Mechanical Relays and Contactors
Solid State Relays and TRIACs
Liquid Level Probes
Control Boards
Sensors and Input Devices
Displays and Output Devices
Flowmeters
Cooling Fans
Transformers
Electromagnetic Interference Filters

HYDRAULIC AND ELECTRICAL SCHEMATICS

Using a Hydraulic Schematic
Using an Electrical Schematic
Electrical Schematic Symbols
Circuit Nodes
Parallel and Series Circuits
Simple Circuit Analysis

SYSTEM MALFUNCTION AND TROUBLESHOOTING FUNDAMENTALS

Symptoms of Malfunctions
Introduction to Troubleshooting
Troubleshooting Electromechanical Systems
Root Cause Identification
Equipment Status Considerations
On Board Diagnostics and Error Codes

TROUBLESHOOTING COFFEE EQUIPMENT

Coffee Equipment Troubleshooting Method
Verification of Electrical and Water Supply
Espresso Machine Brewing System Malfunction
Espresso Machine Steam Boiler System Malfunction
Batch Brewer and Hot Water Dispenser Malfunction
Coffee and Espresso Grinder Malfunction

HAND TOOLS, TUBING, CONDUCTORS, AND CONNECTIONS

Application of Common Hand Tools
Hydraulic Tubing
Hydraulic Fittings
Electrical Wire
Wire Connectors
Common Mechanical Fasteners
Gaskets, Sealants, and Lubricants
Thermal Paste

WATER TREATMENT METHODS AND MEDIA

Water Treatment Methods
Sediment Filtration
Taste and Odor, Chlorine, and Chloramine Removal
Scale Inhibition
Softening
Decarbonization
Reverse Osmosis
Deionization
Mineral Addition/Remineralization
UV Light
Sustainability Considerations

WATER TREATMENT SYSTEM CONSTRUCTION

Operating Principles of Multiple Cartridge and Multiple Stage Systems
Multiple Cartridge System Components
Multiple Stage Cartridges
Water Treatment System Accessories
Point of Entry and Point of Use Systems

REVERSE OSMOSIS WATER TREATMENT SYSTEMS

Reverse Osmosis System Parameters
Reverse Osmosis System Components
Reverse Osmosis System Pumps
Reverse Osmosis System Tanks
Reverse Osmosis System Valves

INSTALLING WATER TREATMENT SYSTEMS

Utilities Requirements
Installing and Adjusting a Decarbonizing Filter
Installing a Multiple Cartridge Water Treatment System
Installing and Adjusting a Reverse Osmosis System

MAINTAINING WATER TREATMENT SYSTEMS

Maintenance Requirements
Sizing Water Treatment Systems
Maintaining a Quick-Change Cartridge System
Maintaining a Reverse Osmosis System

DIAGNOSING AND REPAIRING WATER TREATMENT SYSTEMS

Introduction to Troubleshooting
Root Cause Identification
Obstruction by Sediment or Foreign Material
Reverse Osmosis System Pump Failure
Reverse Osmosis System Membrane Failure
Water Treatment System Mechanical Failures

<p>COMPONENT REPLACEMENT</p> <ul style="list-style-type: none"> Using a Parts Schematic Recommended General Practices Application of Appropriate Torque Replacing Espresso Machine Brewing System Components Replacing Espresso Machine Steam System Components Replacing Batch Brewer Hydraulic System Components <p>COFFEE EQUIPMENT PARAMETERS AND SETTINGS</p> <ul style="list-style-type: none"> Adjusting Espresso Machine Programmed Volume Adjusting Espresso Machine Brewing Pressure Adjusting Espresso Machine Expansion Valve Pressure Adjusting Espresso Machine Brewing Temperature Adjusting Espresso Machine Steam Pressure Adjusting On-Demand and Portion Grinder Output Adjusting Batch Brewer Volume and Brewing Time 	
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Advanced Equipment Support (Coming Soon)

Create preventative maintenance plans and inventory strategies, provide equipment recommendations to customers, navigate complex equipment repairs, and more.

Description – Advanced Equipment Support

Advanced Equipment Support builds on the knowledge of diagnostics, repair, and water treatment systems introduced in the CTechP Intermediate courses to build proficiency in both technical skill and service operations management. In AES, learners synthesize their technical knowledge and experience to create preventive maintenance plans and inventory strategies, provide equipment recommendations to customers, analyze and resolve root causes of equipment malfunction, efficiently navigate complex equipment repairs, refurbish and decommission equipment, and work with common superautomatic espresso machine parts and systems.

Required Prerequisites	Recommended Prerequisites	Delivery Method	Minimum Length	Required Exams Passing Scores
Intermediate Diagnostics & Repair, Intermediate Water Treatment	None	In-person learning or a combination of in-person and distance learning	TBD	TBD