



# POWER GENERATION CURRICULUM

**OVERVIEW:** The electrical power generation process is continuously exposed to catastrophic loss, such as explosions, accidents and burns from unexpected equipment failure or lockout/tagout procedures that are not followed. These procedures are in place to control the high potential for equipment and human error which can result in serious threats to the overall well-being of your operation. Keeping your personnel well trained is clearly the most expedient route to risk reduction.

**COMPLIANCE:** OSHA regulates the operation and maintenance of electric power generation, control, transformation, transmission and distribution lines and equipment under 29 CFR 1910.269. There are specific requirements for “qualified” employees who must be trained in the safety-related procedures that pertain to their respective job assignments and related power generation equipment.

**COURSES:** RedVector offers over 200 courses for Power Generation staff. The library of courses is designed to improve knowledge and skills by providing an understanding of components, safe operation and proper maintenance procedures. Areas covered include boilers, turbines, combined cycle, steam cycle, coal handling, environmental protection, heat transfer, water treatment, startup/shutdown, feedwater systems, furnaces, pollution control and safety, among others.

**AUDIENCE:**

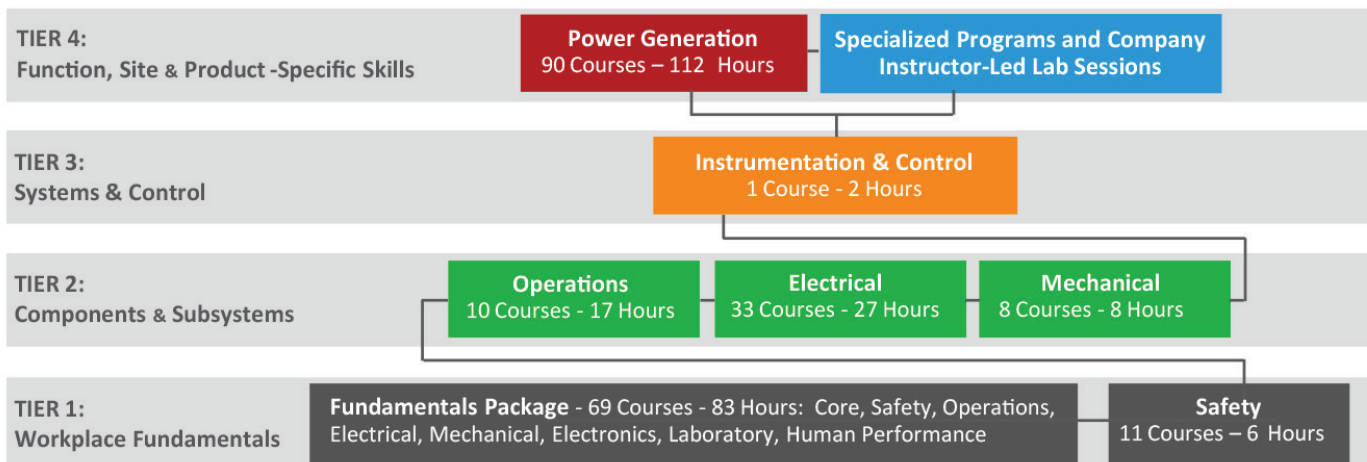
- Power Generation Plant Operators, Managers, Service and Maintenance Personnel
- Employees that need to refresh their cognitive, analytical and communication skills

**eLEARNING:** RedVector’s online approach and easily integrated solutions help save money, improve performance and reach more people. Engaging, interactive modules, with real-world video, animated graphics, pop-up descriptions, demonstrations and simulations, are designed to put the student “on location” in real situational examples.

The flexible delivery model for design, delivery, testing, tracking, reporting and communication works with any learning management system (LMS), or through the RedVector LMS. With either delivery option it is easy to:

- Install/remove courses, enroll/delete trainees and import/export trainee records
- Establish performance requirements and set pre- and post-test passing scores
- Customize curriculum with site-specific content, company-developed learning modules and/or custom test creation
- Generate a variety of reports

## POWER GENERATION - LEARNING PLAN: 222 COURSES – 255 HOURS



# POWER GENERATION CURRICULUM

## FUNDAMENTALS: 69 Courses, 83 Hours

- Industrial Math: Basic Operations, Part 1
- Industrial Math: Basic Operations, Part 2
- Math: Basics
- Industrial Math: Algebra
- Industrial Math: Formulas, Graphs, and Trends
- Hand Tools, Part 1
- Hand Tools, Part 2
- Precision Measurement Tools, Part 1
- Precision Measurement Tools, Part 2
- Forklifts: Operation
- Safety Orientation
- Back Safety
- Fall Protection
- Hearing Conservation
- Bloodborne Pathogens
- Personal Protective Equipment
- Fire Safety
- Classes of Fires and Extinguishers
- Warning Signs and Labels
- Respiratory Protection
- Safety Data Sheets
- Safety: Chemical Health Hazards
- Electrical Safety
- Diagrams: Blueprints
- Operator Responsibilities: Introduction
- Operation - Basic Principles
- Operator Responsibilities: Advanced Operator Responsibilities
- Statistical Process Control: Basic Control Charts
- Troubleshooting: Basic Concepts
- Plant Science: Basic Electrical Principles
- Plant Science: Basic Electrical Circuits
- Electrical Maintenance: Battery Systems
- Fans
- Plant Science: Basic Principles
- Plant Science: Fluid Systems
- Plant Science: Forces and Machines
- Plant Science: Gases and Flowing Liquids
- Plant Science: Solids and Liquids
- Bearing Basics
- Equipment Lubrication: Lubricants and Bearing
- Hydraulics: Routine Maintenance
- Pumps: Basic Types and Operations
- Efficient Pump Operation
- Valves: Electric and Hydraulic Actuators
- Welding: Oxy-Fuel Gas Welding
- Welding: Arc Welding
- Refrigeration System: Operation
- Plant Science: Heat
- Plant Science: Heat Transfer
- Heat Exchangers: Introduction
- SCRs and TRIACs
- Quality Control and Assurance
- Procedure Use and Adherence
- Stop When Unsure
- Decision Making
- Managing Yourself
- "Are You Ready?" Checklist
- Self-Checking (STAR)
- Problem Solving
- Peer Checking
- Co-Worker Coaching
- Managing a Work Group
- The Team Advantage
- Clear Communication
- 3-Way Communication
- Interpersonal Communication
- Turnover
- Discipline

## SAFETY: 11 Courses, 5.8 Hours

- Respirator Fit Testing
- Workplace Ergonomics
- Understanding Forklifts
- Forklift Safety Checks
- Safe Forklift Operation
- Driving Safety
- Asbestos: Hazard Awareness Training
- Hazard Communication
- HazWoper: First Responder: Awareness Level

- HazWoper: Introduction
- Transporting Hazardous Materials

## OPERATIONS: 10 Courses, 17 Hours

- Basic Electrical Safety
- Operator Responsibilities: Basic Operator Responsibilities
- Operator Responsibilities: Communication
- Operator Responsibilities: Plant Production and Safety
- Operator Responsibilities: Trends, Maintenance, and Emergencies
- On-the-Job-Training: Preparation
- On-the-Job-Training: Implementation and Evaluation
- Process Sampling: Testing Samples
- Statistical Process Control: Process Variations
- Environmental Awareness

## ELECTRICAL: 33 Courses, 27 Hours

- Electrical 1: Electrical Safety
- Sources of Electricity
- Electrical Equipment: Electrical Production and Distribution
- Electrical 2: Electrical Lighting
- Basic Control Circuits
- Industrial Switches
- Voltage and Current Principles
- Magnets and Magnetic Fields
- Transformers
- Capacitors, Part 1
- Resistance
- Inductors, Part 1
- Inductors, Part 2
- Alternating Current
- Alternating and Direct Current
- Parallel Circuits
- Series Circuits
- Series-Parallel Circuits
- Ohm's Law
- Kirchhoff's Law
- Use of Ohm's and Kirchhoff's Laws in DC Circuits
- Using Electrical Test Equipment
- Electromagnetic Relays
- Electrical Maintenance: Fasteners
- Electrical 2: Grounding
- Grounding
- Fuses
- Ground Fault Circuit Interrupters
- Circuit Breakers
- Circuit Breakers: Breakers and Switchgear, Part 2
- AC Generator Basics
- DC Generator Basics
- DC Fundamentals Review

## MECHANICAL: 8 Courses, 8.5 Hours

- Sliding Surface Bearings, Part 1
- Sliding Surface Bearings, Part 2
- Rolling Contact Bearings, Part 1
- Rolling Contact Bearings, Part 2
- Basic Lubrication
- Lubrication: Basics
- Equipment Lubrication: Using Lubricants
- Safety: Basics

## INSTRUMENTATION AND CONTROL: 1 Course, 2 Hours

- Core: Principles of Calibration

## POWER GENERATION: 90 Courses, 112.5 Hours

- Power Plant Systems: Power and Energy
- Boilers: Boiler Fundamentals
- Boiler Efficiency 2: Oil and Gas Fired Furnaces
- Efficient Operation of Oil and Gas Fired Boilers
- Analysis of Boiler Efficiency
- Boiler Instruments and Control
- Efficient Boiler Operation
- Turbine Efficiency, Part 1
- Turbine Efficiency, Part 2
- Turbine Efficiency, Part 3
- Analysis of Turbine Efficiency
- Condenser Efficiency
- Efficient Condenser Operation
- Introduction to Heat Rate Improvement
- Feedwater Heater Efficiency

- Power Plant Efficiency: Problems and Analyses
- Efficient Power Plant Operation
- Cycle Efficiency
- Material Handling: Tank Trucks
- Power Plant Operation: Basic Principles
- Power Plant: Power and Energy
- Electrical Energy and Power
- Power Plant Systems: Power Generation
- Power Plant Turbines: Bearings and Operation
- Combustion Turbine: Components
- Combustion Turbine: Support Systems, Part 2
- Power Plant Boilers: Startup and Shutdown
- Power Plant Boilers: Normal Operations
- Boilers: Basic Principles and Types
- Power Plant Boilers: Combustion and Operation
- Boilers: Basic Principles and Types
- Boilers: Combustion, Water, and Steam
- Power Plant Boilers: Water and Steam
- Power Plant Boilers: Abnormal Conditions and Emergencies
- Combustion Turbine: Normal Operations
- Combustion Turbine: Principles
- Introduction to Heat Rate Improvement
- Combustion Turbine: Support Systems, Part 1
- Principles of Heat Transfer
- Power Plant Thermodynamics
- Boiler Efficiency 1: Air Heaters and Preheaters
- Boiler Efficiency 2: Windboxes, Burners, and the Furnace
- Boiler Efficiency 3: Superheaters, Reheaters, and the Economizer
- Combined Cycle: Normal Operations
- Combined Cycle: Abnormal Operations
- Combined Cycle: Heat Recovery Steam Generators
- Combined Cycle: Distributed Control Systems
- Furnaces: Furnace Introduction
- Furnaces: Furnace Fundamentals
- Furnaces: Startup and Shutdown
- Furnaces: Operating Conditions
- Power Plant: Steam Cycle
- Power Plant Systems: Steam Cycle
- Power Plant Turbines: Steam Flow
- Power Plant Systems: Condensate and Feedwater Systems
- Power Plant: Condensate and Feedwater System
- Power Plant Systems: Steam Systems
- Power Plant: Condenser and Circulation Water
- Power Plant Systems: Condenser and Circulating Water
- Power Plant: Steam Systems
- Coal Handling: Overview, Part 1
- Coal Handling: Overview, Part 2
- Coal Handling: Overview, Part 3
- Coal Handling: Bringing in Barges
- Coal Handling: Conveyors
- Coal Handling: Rail Yard Operations
- Coal Handling: Car Dumpers
- Coal Handling: Bulldozers
- Coal Handling: Coal Pile Management
- Coal Handling: Coal Yard Maintenance
- Coal Handling: Ash Handling
- Coal Handling: Dust Control
- Coal Handling: Dust Control Equipment, Part 1
- Coal Handling: Dust Control Equipment, Part 2
- Coal Handling: Handling Wet and Frozen Coal
- Coal Handling: Stackers
- Coal Handling: Trippers
- Coal Handling: Auxiliary Equipment
- Coal Handling: Control Equipment
- Coal Handling: Coal Preparation Equipment
- Environmental Protection: Air Pollution
- Environmental Protection Systems: Water Pollution
- Power Plant Operation: Safety and Pollution Control
- Fundamentals of Process Solubility
- Power Plant Protection: Fundamentals
- Power Plant Protection: Boiler and Turbine Protections
- Power Plant Protection: Integrated Systems
- Water Treatment: Wastewater, Part 1
- Water Treatment: Wastewater, Part 2
- Environmental Protection: Water Pollution & Waste Disposal