Power Plant Engineer/Operator

This Utilities Industry specific skills curriculum provides trainees with the courseware that enables them to perform the tasks associated with a *Power Plant Engineer/Operator*. This print based curriculum has been developed to meet the subject requirements of either an apprenticeship or an organization's skills development program. When combined with on-the-job training, this program will provide trainees with the comprehensive skills and knowledge they will need to perform in this trade area.

The recommended Power Plant Engineer/Operator curriculum covers the primary skill needs for electric (including coal and fossil fuel plants), hydroelectric, steam, and nuclear power plant operations, and substation operations. The curriculum provides the mathematics background needed to understand the principles and operation of the machinery that generates electricity. Scientific, mechanical technologies, and electrical/electronics courses provide a technical foundation for understanding machinery and equipment operation/maintenance used in utilities. The training covers power plant machinery and equipment including generators, motors, switchgear, protective relaying, and electric power generation, transmission, and distribution.

This curriculum, as modified by custom assembling the appropriate courses, applies to utilities positions such as: Dispatcher, Generating Station Operator, Plant Relayman, and Power Plant General Instrument Mechanic. This training is appropriate for both entry level and experienced utilities employees.

Upon completion of this program, students will be able to:

- Perform calculations using algebra, trigonometry, and geometry.
- Understand the meaning of mathematical formulas as applied to mechanics.
- Understand the principles, components and measuring instruments associated with AC and DC electricity.
- Understand the operation and control of the common motors and generators found in utilities.
- Differentiate between distribution and power transformers by construction and application.
- Discuss the application of protective relays to protect motors, generators, buses and transformers.
- Understand the purpose and operation of the various equipment used in electric power generating stations.
- Describe the functions of the equipment used in power distribution stations.
- Explain the principles of operation of the various types of steam generators.
- Describe the methods used to regulate the voltage of distribution systems.

Base Curriculum

Course Title	Course Number
Pre-Technical Foundation Skills	
Trades Safety: Getting Started	186001
Working Safely with Chemicals	186002
Fire Safety	186003
Material Handling Safety	186006
Basic Industrial Math	Block X21
Addition and Subtraction	186008
Multiplication and Division	186009
Fractions, Percents, Proportions, and Angles	186010
Metric System	186011
Formulas	186012
Introduction to Algebra	186013
Practical Measurements	Block X22
Linear and Distance Measurement	186021
Bulk Measurement	186022
Temperature Measurement	186023
Energy, Force, and Power	186024
Fluid Measurement	186025
Problem Solving and Troubleshooting	186073
Introduction to Algebra, Geometry, and Trigonometry	Block X02
Algebra: Monomials and Polynomials	X0201
Algebra: Factoring	X0202
Algebra: Addition and Subtraction of Fractions	X0203
Algebra: Multiplication and Division of Fractions	X0204
Algebra: Linear Equations	X0205
Algebra: Simultaneous Linear Equations	X0206
Algebra: Determinants	X0207
Algebra: Quadratic Equations	X0208
Algebra: Exponents	X0209
Algebra: Radicals and Imaginary Numbers	X0210
Applied Geometry	186085
Practical Trigonometry	186086
Working Safely with Electricity	4400
Quality Concepts: Tools and Applications	186036
Preventive Maintenance	286085
Preventive Maintenance Techniques	286086
Predictive Maintenance	286087
Scientific Principles	
Heat, Part 1	686001
Heat, Part 2	686002
Steam	2620
Elements of Chemistry	5011
Engineering Chemistry	5012
Heat Transfer	2545

Power Plant Operating Principles

Mechanical Technologies and Maintenance

Blueprint Reading

Electrical/Electronics Principles and Equipment

Electric and Steam Power Generation Plants – Equipment Operation and Maintenance

Electrical Equipment Applications Used in the Utilities Industry – Operations and Maintenance

Transformers....4040
DC Machines....4030A-B
Transformer Operation....4041
Distribution and Power Transformers....4042
Instrument Transformers....6793
Storage Batteries....4343
Electric Power Measurements....4019A-B

Transmission and Distribution of Electric Power

Local Distribution of Electrical Power....006038
Switchgear....086092
Protective Relaying....6538A-B
Telemetering....4048
Voltage Regulators for Generators....4368
Voltage Regulation of Distribution Systems....4370
Electric Power Generating Stations....6589A-B
Electric Power Substations....6590A-B
Transmission Lines....4358
Power Line Calculations....6256
Underground Power Systems....006039
Transformation for Lineworkers....786E05
Underground Distribution for Lineworkers....786E06
Electrical Power Distribution and Transmission for the Technician....786E01

Estimated Curriculum Duration: 1,655 hours.
Number of Exams: 202.

Optional: Hydro-Electric, Nuclear Power Plant Operations

Hydraulic Turbines....6718A-C
Principles and Uses of Nuclear Energy....6683

Estimated Duration: 40 hours.
Number of Exams: 4.