



Proficiency Certification

Electric Power – Design and Management

APT's Proficiency Certification Program in Electric Power Systems is based on a set of objectives that are valuable to the industry, the employer and the student. This program incorporates strategically designed curriculum to maximize the knowledge and skills in the electric power industry. This certification program consists of two levels of proficiency. **Level I** provides the important knowledge components needed to confidently work in this specialization. **Level II** builds the student's knowledge and skills to the level to proficient. **This certification credit applies towards APT's Associate Degree in Applied Sciences – Electric Power Systems.** This program is a must for those interested in a lifelong career in electrical power systems and wants to be productive, proficient, and recognized.

***Note:** APT is recognized by the North American Electric Reliability Corporation as a continuing education provider who adheres to NERC Continuing Education Program Criteria. These classes provide NERC CE Hours.*

Program Objectives

- **Productively contribute and interact** with technical and engineering professionals in electric power systems
- **Discuss proper installation, maintenance and operation** of power equipment in accordance to industry practices.
- **Describe system protection, monitoring, control and planning** principles and methodologies
- **Confidently discuss distribution systems** with field operations personnel
- **Discuss the safety aspects** of power system operations
- **Continually promote** your future through valuable courses while earning recognition by certification.
- **Learn installation and repair** techniques to become productive and valuable.

Features and Benefits

- Course curriculum, objectives and learning outcomes target employment and industry needs
- Interactive instruction from highly qualified and experienced instructors
- No prerequisites!
- State-of-the-art curriculum that is always updated
- Vast course selection provides mobility and specialization
- Flexibility in scheduling
- **APT** considers prior experience or other accredited courses towards certificate and degree credit.

Courses

Level I Certification (Competent; 112 hrs, 14 Days)

- PC100 Electric Power System Fundamentals (24 hrs)
- PC101 Power System Equipment (16 hrs)
- PC102 Distribution Systems (24 hrs)
- PC103 Switching, Grounding & Safety (16 hrs)
- PC110 Power Calculations (16 hrs)
- PC120 Power Plants (16 hrs)

Level II Certification (Proficient; 112 hrs, 14 Days)

- PC104 Protection Principles (16 hrs)
- PC105 Monitoring & Control (16 hrs)
- PC130 Power Quality (16 hrs)
- PC205 Monitoring & Control – II (16 hrs)
- PC220 Reliability and Security (16 hrs)
- PC230 Voltage Control & Collapse (16 hrs)
- PC260 Utility Telecommunications Systems (16 hrs)

Program Hours: 224 (28 days)

Accreditation



APT is accredited by the U.S. Department of Education's Distance Education and Training Council (DETC).



All courses qualify for CEUs (Continuing Education Units) approved by the International Association of Continuing Education and Training



APT is recognized by the North American Electric Reliability Corporation.



APT courses are approved by Veterans Administration, GI Bill and DANTES!

Contact APT for more information!

www.aptc.edu

(800) 431-8488

LEVEL I (Competent)

PC100 Electric Power System Fundamentals (24 hrs)

Agencies ◦ Terminology ◦ Generation ◦ Transmission ◦ Substations ◦ Distribution ◦ Protection ◦ Interconnections ◦ Control Centers ◦ Telecommunications ◦ Basic Concepts (circuit components, Ohm's Law, AC/DC, single-phase, three-phase, delta and wye)

PC101 Power System Equipment (16 hrs)

Substation Layouts ◦ Transformers ◦ Breakers ◦ Switches ◦ Arresters ◦ Capacitors ◦ Reactors ◦ Control Buildings ◦ Batteries & Chargers ◦ Lines (design, maintenance, vegetation and underground) ◦ Operating Ratings (substation equipment and lines)

PC102 Distribution Systems (24 hrs)

Radial ◦ Overhead ◦ Underground ◦ Metering ◦ Consumption ◦ Protection Overview ◦ Voltage Control (regulators, line drop compensators, capacitors and reactors) ◦ Load Balance ◦ Power Quality ◦ Service Reliability ◦ Automation

PC103 Switching, Grounding & Safety (16 hrs)

Switching & Tagging ◦ Grounding Systems ◦ Ground Potential Rise ◦ Safety (touch-step, personal protective equipment) ◦ Equipment Testing ◦ Arc-Flash ◦ NESC Clearances ◦ PCB ◦ MSDS

PC110 Power Calculations (16 hrs)

Apply basic power system calculations ◦ circuit analysis 3-phase power systems ◦ High-Voltage ◦ High Current ◦ insulation ◦ conductors ◦ clearances ◦ designs ◦ special issues ◦ voltage drop ◦ fault calculations ◦ introduction to symmetrical components ◦ applications ◦ engineering and operations fundamentals

PC120 Power Plants (16 hrs)

Introduction power plants and power plant equipment ◦ Discusses steam turbines, hydro turbines, combustion turbines and common renewable energy plants ◦ Explains distributed generation ◦ Describes electric generator components and characteristic curves

LEVEL II (Proficient)

PC104 Protection (16 hrs)

Faults ◦ Fuses ◦ Relay Types ◦ Sensing Equipment ◦ Control Circuits ◦ Distribution (under-frequency, undervoltage, overcurrent, series reactors and reclosing) ◦ Transmission (zones, differential, breaker failure, out of step, pilot, phase comparison, transfer trip and single pole tripping) ◦ Interconnection ◦ Special and Intelligent Schemes ◦ Disturbance Monitoring Equipment ◦ Transmission Loadability

PC105 Monitoring and Control (16 hrs)

Monitoring System Conditions ◦ Equipment Organization ◦ SCADA (master & remotes) ◦ E-Tagging ◦ EMS ◦ Time Error Correction ◦ Automatic Time Error Correction ◦ Satellite Time Calibration ◦ Intelligent Devices ◦ Substation Automation

PC130 Power Quality (16 hrs)

Power quality issues ◦ concerns ◦ performance standards ◦ problem types ◦ vulnerable configurations ◦ stray voltages and currents ◦ radio/television interference ◦ ferroresonance ◦ cause analysis ◦ resolution ◦ test, monitor and troubleshoot ◦ case studies

PC205 Monitoring and Control – II (16 hrs)

Gain working knowledge of control center real time data gathering equipment ◦ communications links ◦ control centers and remote terminal equipment connections ◦ transducers ◦ scale factors ◦ interface relays ◦ calibration procedures ◦ monitoring devices ◦ testing and troubleshooting ◦ cyber security in telecommunications

PC220 Reliability and Security (16 hrs)

Control Center Operations ◦ System Reliability Concepts ◦ Reliability Awareness ◦ Equipment Reliability ◦ System Reliability ◦ Cyber Security (terminology, application, situational awareness, vulnerability analysis, studies, drills, threats) ◦ Security Improvement

PC230 Voltage Control and Collapse (16 hrs)

Voltage Control Concepts (excitation, reactive support, regulators, static var compensators, power factor correction and load control) ◦ System Operating Limits (derivation, normal, emergency, flexibility) ◦ Voltage Collapse (types, causes, actions, responsibility)

PC260 Utility Telecommunications Systems (16 hrs)

Telecommunications applications for electric operations ◦ transport fundamentals (fiber optics, microwave, power line carrier, wireless, satellite and wireline communication systems) ◦ substation and distribution automation ◦ auto-transfer switches ◦ Programmable Logic Controllers (PLC) ◦ Intelligent Electronic Devices (IED) ◦ communications protocols (Ethernet, ATM, SONET, IP and Utility Communications Architecture)