

A large, flowing blue graphic element that curves from the left side of the page towards the bottom right, creating a sense of movement and depth. It is composed of multiple overlapping, slightly wavy lines in various shades of blue.

PJM Training Curriculum



PJM Training

PJM's Member Training Department is committed to providing our members a wide variety of timely, high-quality training programs that enable all PJM stakeholders to conduct business and operate efficiently within PJM. Our focus is knowledge transfer for members' business success.

The training offerings are designed to provide participants with the knowledge required to do business or operate within PJM. Locations and timing of training offerings vary. See www.pjm.com/services/training/train-adv.html for current training offerings and registration information.

Training is free for employees and authorized representatives of PJM members and for those from entities pursuing PJM membership. All others will be invoiced \$500 per person to attend the course. Additional charges for non-members may apply for courses of an extended nature. Customized training is available for a fee.

Much of PJM's training is available online and can be accessed at <http://www.pjm.com/services/training/train-media.html>.

PJM reserves the right to discontinue registration and/or cancel training sessions if enrollment is not sufficient. Every effort will be made to notify registrants if a change is made.

Introduction

Course Title	NERC CEH	Generation Owners/ Operators/ Schedulers	Load Serving Entities (LSE)	Power Marketers/ Traders	Transmission Operators	General/ Government/ Consumer Groups/etc.
PJM 101 The Basics	N/A	HR	HR	HR	HR	HR
Initial Training Program	154	HR	E	E	HR	
Extended Training Class: System Dynamics	31.5	R			R	
LMP 101	N/A	R	R	R	E	R
RPM 201	N/A	HR	HR	E		E
Market Settlements 301	N/A	E	E	E		
Generation 101	8	HR		HR	E	
Generation 201	8	HR			E	
Generation 301	8	HR	R		E	
Operation 101	8	HR	E	R	HR	
System Operator Seminar	22.5	HR	E		HR	
Transmission 101	15	R		E	HR	
Transactions 201	N/A			HR		
System Restoration	14.5	HR			HR	
Mkt Settlements Primer	N/A	R	R	R		
PJM Demand Side Response	N/A		R			R
System Planning 201	N/A	R			R	E

HR - Highly Recommended (Required to do business)

R - Recommended (Will give more complete information for business need)

E - Elective (Will provide more information in other areas of interest)

PJM 101 - The Basics

This one-day course provides a basic overview of PJM and the functions that PJM performs. It is designed to be the introductory course to the PJM training curriculum. The course will give participants an overview of various topics and allow them to determine what additional training courses are desired. The participant will receive a basic understanding of power system operation at PJM and locational marginal pricing as it pertains to the PJM Energy Market.

Topics:

- Power System Concepts
- PJM Overview and Governance
- System Operations
- Energy Markets and Locational Marginal Pricing
 - Fixed Transmission Rights (FTRs)
 - Two-Settlement Overview
- Transmission Service
- Ancillary Services
- Overview of Capacity
- Regional Planning Process
- eDATA

Intended Audience:

This course is recommended for those who are new members of PJM (or to the power system industry) or new employees of existing PJM members. It is also recommended for governmental agencies that desire a basic understanding of PJM and its functions. Those participants doing business in PJM on a consistent basis will need additional training beyond the scope of this course in those areas where they have interest.

Prerequisite knowledge: None

Offering:

PJM 101 is offered six times per year either in person or virtually via the Internet. See www.pjm.com under the training link for information.

Locational Marginal Pricing 101 (LMP 101)

This one-day course provides a more in-depth look at locational marginal pricing (LMP) and related concepts. The course will examine the inputs to LMP, how LMP is used in PJM and provide several LMP examples. Dynamic simulations of LMP will also be presented. Fixed Transmission Rights (FTRs) will also be defined and explained as a hedging mechanism to transmission congestion charges.

Topics:

- Locational Marginal Pricing (LMPs)
- LMP Examples
- Financial Transmission Rights (FTRs)
- FTR Auctions
- eFTR Internet Tool

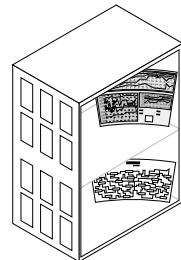
Intended Audience:

This course is recommended for those who require a working knowledge of LMP, its inputs and how it is calculated. It is also recommended that those who participate in the FTR markets attend this course as well.

Prerequisite knowledge: An understanding of generation dispatch is helpful but not required.

Offering:

LMP 101 is offered one time per year either in person or virtually via the Internet. See www.pjm.com under the training link for information.



Transactions 201 (TACT 201)

This two-day course is designed to provide the participant with a basic level of knowledge on core topics related to conducting transactions in the PJM Market. The topics are intended to orient participants to the processes and eTools needed to conduct external and internal transactions in the PJM Market.

Exercise Topics

- Overview of Two Settlement
- eDATA
- EES - Automated Scheduling
- Internal Transactions and eSchedules
- Overview of Market Monitoring
- Overview of Market Settlements
- Two Settlement - Virtual Bidding and Transactions

Intended Audience:

This course is targeted to new marketers who plan to conduct business in the PJM Market. The course is limited to the basics and mechanics of transactions in the PJM Market. Those interested in a more comprehensive Markets training should refer to the Load Serving Entity training course.

Prerequisite knowledge: It is assumed that participants have completed PJM 101 training. It is strongly recommended that participants have a working knowledge of LMP. A general understanding of the electric industry is helpful but not required.

Offering:

TACT 201 is offered as needed. See www.pjm.com under the training link for information.

Reliability Pricing Model 201 (RPM 201)

This one-day course provides a more in-depth look at the PJM reliability assurance construct and related topics. The course is intended to provide all of the necessary information for those who participate in the PJM RPM auctions.

Topics:

- Obligations
- Capacity Resources
- Markets and Auctions
- Deficiency Charges
- Active Load Management (ALM)
- Tools

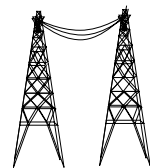
Intended Audience:

This course is recommended for those who require a working knowledge of the PJM RPM construct. It is also recommended for Generation Owners and Load Serving Entities (LSE) who either have a capacity obligation or have capacity to sell.

Prerequisite knowledge: It is recommended that participants take PJM 101 prior to taking this course and that they have a working knowledge of FTRs prior to taking this course.

Offering:

RPM is offered two times per year either in person or virtually via the Internet. See www.pjm.com under the training link for information.



Generation 101 (GEN 101)

This one-day course is the first in a series of three courses designed to provide the participant with a basic level of knowledge on topics critical to generation dispatch in PJM. The topics were chosen to give those participants who are unfamiliar with generation and generation dispatch a working knowledge of these concepts.

Topics:

- Basics of Generation Plants
- How PJM Operates and Dispatches
- LMP Overview
- PJM Web site and eData

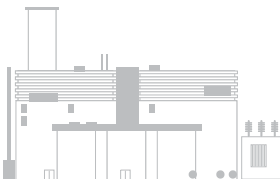
Intended Audience:

This course is specifically targeted to Generation Owners who schedule, dispatch or support generation in the PJM area. It is designed for those who are new to the generation field or new to how PJM generation dispatch functions.

Prerequisite knowledge: A general understanding of the electric industry is helpful but not required.

Offering:

GEN 101 is offered four times per year in person. See www.pjm.com under the training link for information.



Generation 201 (GEN 201)

This one-day course is the second in a series of three courses designed to provide the participant with a basic level of knowledge of topics critical to generation dispatch in PJM. This course explores the details of bidding generation into the Day-Ahead Market and reporting and scheduling generation outages. Emphasis is also given to the responsibilities of generation operators in real time.

Topics:

- Generation Outages and eDART
- Two Settlement Overview
- PJM Day-Ahead Scheduling
- eDART Gen Checkout

Intended Audience:

This course is specifically targeted to Generation Owners who schedule, dispatch or support generation in the PJM area.

Prerequisite knowledge: A general understanding of the electric industry is helpful but not required. Completion of GEN 101 or equivalent knowledge is recommended.

Offering:

GEN 201 is offered four times per year in person. See www.pjm.com under the training link for registration information.

Generation 301 (GEN 301)

This one-day course is the third in a series of three courses designed to provide the participant with a basic level of knowledge of topics critical to generation dispatch in PJM. This course explores the details of ancillary services within PJM. An overview of Market Monitoring in PJM is also provided.

Topics:

- Ancillary Services
 - Regulation Market
 - Spinning Reserve Market
 - Reactive Services
 - Blackstart Service
- Operating Reserve Settlements
- Overview of Market Monitoring
- PJM System Operator Certification Program

Intended Audience:

This course is specifically targeted to Generation Owners who schedule, dispatch or support generation in the PJM area.

Prerequisite knowledge: Completion of GEN 201 or equivalent knowledge is recommended. A working knowledge of the PJM Energy Markets is recommended.

Offering:

GEN 301 is offered four times per year in person. See www.pjm.com under the training link for registration information.



Operations 101 (OPS-101)

This one-day course is designed to be a short course on PJM operations. It provides the critical, need-to-know information for system operators in both the transmission and generation fields. The course serves as an abbreviated version of the Initial Training Program (ITP).

Topics:

- Reserves-Scheduling, Reporting and Loading
- Capacity Shortage Procedures
- Supplementary Status Report
- Light Load Procedures
- Emergency Operations
- PJM All-Call and Communications

Intended Audience:

This course is specifically targeted to generation and transmission system operators who receive and respond to PJM Dispatch instructions (All-call or otherwise). This course can also serve as a partial review for those preparing for PJM Certification.

Prerequisite knowledge: Understanding of power system operation is strongly recommended. A general understanding of PJM Operations is recommended.

Offering:

OPS 101 is offered four times per year in person. See www.pjm.com under the training link for registration information.

Market Settlements (MS 301)

This advanced-level one-day course is designed to provide details of the market settlements process and the components of a typical PJM invoice. The course will describe the various possible charges and credits and present exercises on spot market interchange calculations.

Topics:

- Spot Market Interchange
- Congestion Charges
- Details of a PJM Bill (charges and credits)
- PJM Billing Cycle
- Inputs to the Settlement Process
- Operating Reserves
- eMTR Internet Tool

Intended Audience:

This course is specifically targeted to those requiring more information on the details of the market settlements process. It is recommended for those individuals who analyze the PJM invoice and for those wanting a better understanding of the financial implications of operations.

Prerequisite knowledge: It is assumed that participants have a working knowledge of PJM and the PJM markets. Completion of PJM 101 or equivalent knowledge is required. Completion of LSE 201, GEN 201 and/or GEN 301 is strongly recommended.

Offering:

Market Settlements 301 is offered one time per year in person or virtually via the Internet. See www.pjm.com under the training link for registration information.



Initial Training Program (ITP)

This intensive four-week course is designed to be a comprehensive training program for a new system operator. The course can be taken on a standard track (all modules), a generation track or a transmission track. It incorporates power simulations, field trips and many exercises to enhance participant learning. The course is presented at a very detailed level on all topics.

Topics:

- Introduction to PJM
- Communications
- Generating Unit Basics
- Generation Control
- Generation Tools
- Energy Market
- Substation Equipment
- Transmission System Operation
- Fundamentals of Protective Relaying
- Emergency Operations
- System Restoration

Intended Audience:

This course is specifically targeted to system operators in generation and transmission who are new to operations or who require a detailed level of knowledge in operations-related topics.

Prerequisite knowledge: It is assumed that participants have a working knowledge of electrical theory. An electrical theory module and quiz must be completed as a self-study exercise prior to attending the Initial Training Program (ITP).

Offering:

ITP is offered two times per year in person. See www.pjm.com under the training link for registration information.

System Dynamics

This one-week course is designed to enhance the system operators' knowledge of power system dynamic phenomena and increase their awareness of the effects of disturbances on the interconnected system.

Topics:

- Review of Power System
- Overview of System Dynamics
- Frequency Problems and Control
- Islanded System Operations
- Voltage Deviations
- Voltage Collapse
- PJM Methodology for Controlling Voltage
- Power System Oscillations
- PJM Stability Criteria
- Other Dynamic Phenomena

Intended Audience:

This course is specifically targeted to experienced system operators in generation and transmission. This course may also be of value to those who require a detailed level of knowledge in operations-related topics.

Prerequisite knowledge: Completion of the ITP or equivalent experience is recommended.

Offering:

System Dynamics is offered one time per year in person. See www.pjm.com under the training link for registration information.

PJM System Operator Seminar

This continuing education program is designed to keep generation and transmission system operators abreast of PJM and industry changes. The agenda is organized into generation, general and transmission topics to allow for part- and full-time attendance. Topics are selected based on surveying operations personnel and identified priority training needs. The seminar includes multiple sessions to accommodate all system operators who operate on the PJM system.

Topics:

- State of PJM
- Update on Markets
- Refresh on Emergency Procedures
- Lessons Learned from Operating Events
- Communications
- Update on PJM and NERC Certification
- Operator's Forum
- NERC and Industry Updates
- Refreshers on Technical Topics

Intended Audience:

This program is specifically targeted to system operators who operate the PJM bulk power system and/or dispatch generation. Operations and markets personnel may also benefit from attending selected parts of the program.

Prerequisite knowledge: It is assumed that participants have a working knowledge of PJM operations and markets.

Offering:

Nine times in the spring of each year. See www.pjm.com under the training link for specific program and registration information.

Transmission 101 (TRANS 101)

This two day course is designed to provide the participant with a basic level of knowledge on selected topics critical to transmission operations in PJM. The topics are intended to orient participants to the working knowledge needed to operate on the PJM transmission system. The balance of topics critical to PJM transmission operation are found in Operations 101.

Topics:

- Introduction to the PJM Organization
- How PJM Operates and Dispatches
- Overview of Markets, LMP and Two Settlement
- PJM Web site
- Transmission Outages and eDART
- PJM System Operator Certification Program

Intended Audience:

This course is specifically targeted to transmission operators who monitor, operate and maintain transmission facilities under the direction of PJM. It is targeted to those new to the transmission field or new to PJM transmission operations functions.

Prerequisite knowledge: A general understanding of the electric industry is helpful but not required.

Offering:

TRANS 101 is offered four times per year in person. See www.pjm.com under the training link for registration information.

Additional Training Courses

System Restoration Workshop

This course will discuss the theory and application of restoring a power system from a complete system blackout. Topics include causes of blackouts, transmission restoration, blackstart generation, load restoration and reserves during restoration. Simulation software in a small group setting will be utilized to practice restoration of a small generic power system. This training is targeted to transmission and generation system operators. This two-day workshop will be offered two times per year.

Market Settlement Primer

This introductory course to Market Settlements will focus on where to find more information and how to interpret a PJM invoice. Many of the available settlement reports will be discussed with emphasis on how the values were derived. This course is a precursor to the more detailed MS 301.

PJM Demand Side Response

The PJM Demand Side Response course provides participants (curtailment service providers, load serving entities and electric distribution companies) necessary detail to participate in load response market opportunities. System load that has the ability to react to wholesale prices or respond to PJM emergency conditions may be compensated for energy and capacity. Market opportunities are available for system load to provide ancillary services, such as Synchronous Reserves or Regulation. This one day course will be offered two times per year.

Additional Training Courses

System Planning 201

This course will describe details of the PJM Regional Transmission Expansion Planning (RTEP) process. Details of study methodologies, tools, generation interconnection and procedures will be described. This course is designed for transmission planners at PJM's Transmission Owners, as well as anyone interested in more details on the PJM planning process. This one-day course will be offered one time per year.



Member Relations Hotline

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