

# Apprenticeship Training Models

*Leveraging EPCE online courses to make apprentice training more efficient and improve the apprentices' learning experience*

The retirement bubble is coming—a large percentage of the energy workforce is slated for retirement within the next few years, which will leave a critical employment gap. This gap will have a negative impact on utilities' ability to meet the demands of the work. The 21<sup>st</sup> century economy demands a workforce with some degree of post-secondary education and the adaptability to respond immediately to changing situations.

EPCE is playing a lead role in meeting these demands by implementing apprenticeship training models that use online Electric Power Technology courses to meet specific training needs within approved apprenticeship training programs.

The EPCE-sponsored online Electric Power Technology education program, delivered by the Bismarck State College National Energy Center of Excellence (BSC), provides apprentices with a core set of skills and competencies, as well as a foundation in electrical systems, transformers, and electric components. EPCE, a collaborative industry coalition, developed and regularly maintains the coursework through a national curriculum committee made up of representatives from major industry organizations.



## Online Electric Power Technology Courses at the Bismarck State College National Energy Center of Excellence

### Core Technical Courses

ELPW 101 – Basic Computer Skills  
 ENRT 103 – Applied Math  
 ELPW 105 – Electrical System Fundamentals  
 ENRT 106 – DC Fundamentals  
 ENRT 108 – AC Fundamentals  
 ELPW 109 – Electrical Industry Safety  
 ELPW 110 – Basic Print Reading  
 ELPW 111 – Introduction to the Electrical Industry and Power Grid  
 ELPW 112 – Electrical System Components  
 ENRT 115 – Industrial Composition  
 ELPW 118 – Industrial Communications  
 ELPW 200 – Advanced Print Reading  
 ELPW 202 – Advanced Industrial Safety  
 ELPW 204 – Advanced Electrical Systems  
 ELPW 206 – Electrical System Protection

### Specialization Areas

#### Line Construction

ELPW 210 – Overhead Transmission and Distribution Line Construction  
 ELPW 230 – Underground Line Construction  
 ELPW 250 – Transformers

#### Substation

ELPW 211 – Substation Relays  
 ELPW 231 – Substation Operations  
 ELPW 251 – Substation Construction and Maintenance

#### System Design

ELPW 208 – Advanced Math  
 ELPW 212 – System Design Basics  
 ELPW 232 – System Design Analysis  
 ELPW 252 – Civil Design

#### Metering

ELPW 208 – Advanced Math  
 ELPW 213 – Fundamentals of Metering  
 ELPW 233 – Single-Phase and Polyphase Metering  
 ELPW 253 – Advanced Metering Technology



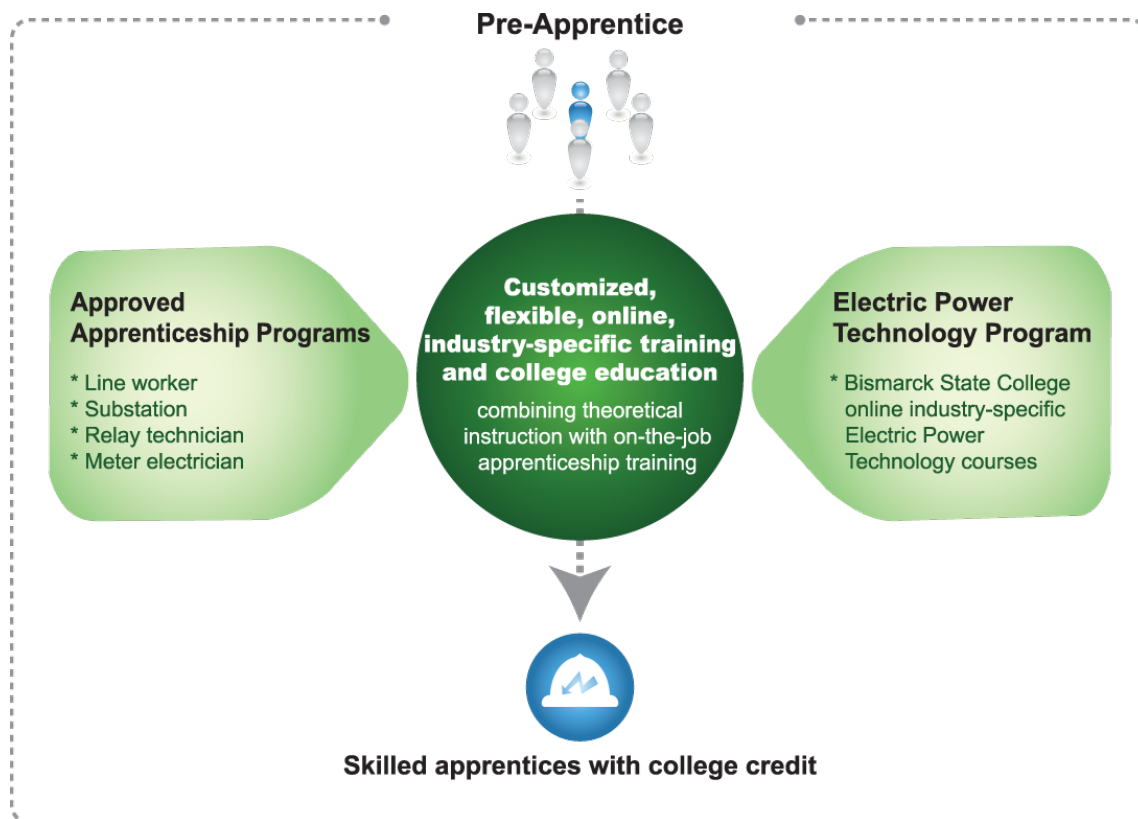


### Advantages of the Program

- Apprentices have a foundation of knowledge from the online, industry-specific courses, which allows the on-the-job instruction to go deeper into the subject matter.
- After gaining more knowledge, apprentices are better prepared to step up to their responsibilities, show increased confidence, and be inquisitive and engaged.
- The online courses allow for flexibility with the company apprenticeship schedule, allowing for 4-, 8-, 12-, and 16-week offerings.
- Apprentices receive college credit for the courses.
- Upon completion of the apprenticeship program, apprentices are well on the way to obtaining an associate’s college degree.
- This program increases the number of college graduates at the company.
- The online courses are attractively priced when compared to other outsourced training options.



“What I’ve learned thus far in the Electric Power technology course has really given me the confidence to feel like I can step up and take on the responsibilities the company has entrusted in me. I’ve been able to take away from this course some new concepts and ideas that the journeymen I work with haven’t seen or heard of yet. This really helps us as a company and as an industry.” – **David Bird**, heavy apparatus technician apprentice, Tri-State





## The Substation Apprenticeship Model at Tri-State Generation and Transmission Association



Based on core training standards established at Tri-State, the training department created a four-year apprenticeship program using a blended learning solution. Jim Duffy, training coordinator, likens the program to a three-course dinner:

### The Appetizer

E-learning modules – Beginning every six months, new apprentices complete 45-minute to 1-hour modules on their computers.

### The Main Course

EPCE online degree courses – Duffy identified the following college credit courses from EPCE’s online Electric Power Technology courses at BSC that align with the substation apprenticeship program course objectives:

ELPW 101	Basic Computer Skills
ELPW 112	Electrical System Components
ELPW 110	Basic Print Reading
ELPW 208	Advanced Math
ELPW 213	Fundamentals of Metering
ELPW 206	Electrical System Protection
ELPW 233	Single-Phase and Polyphase Metering
ELPW 211	Substation Relays
ELPW 253	Advanced Metering Technology
ELPW 231	Substation Operations
ELPW 118	Industrial Communications
ELPW 204	Advanced Electrical Systems
ELPW 250	Transformers
ELPW 251	Substation Construction & Maintenance

“These courses are heads above the rest and our students find them very challenging,” said Jim. “But it would be a waste of the students’ time and our company’s resources if they weren’t. The courses are a great investment for everyone.”

## The Dessert

Instructor-led – these courses are delivered face-to-face by Duffy and other Tri-State trainers. The students have a foundation of knowledge from the online courses, which allows the in-person courses to go deeper into the subject based on questions about topics that need further explanation.



“Only halfway through the program, the apprentices are starting to demonstrate knowledge that took the journeymen five or more years to learn on the job.” – **Jim Duffy**, *TriState Generation, Tri-State*

Apprentices are also required to complete a designated amount of hours doing hands-on work in the field and are assigned a field training specialist, who is responsible for mentoring them. Every six months, the apprentices are assessed and either recommended for advancement or held back for improvement and given a remedial plan tailored to their needs.

## Results

***EPCE membership brings education providers recognized both as leaders in online education as well as experts in their respective fields.***

Based on Tri-State’s membership in EPCE, Duffy was already aware of the ELPW program at BSC. As an accredited college BSC has a good reputation in the industry, so he had no trouble obtaining buy-in from upper management.

***The online ELPW curriculum is built by industry subject matter experts and taught by content expert instructors with hands-on experience in the energy industry.***

All disciplines at Tri-State have a superintendent responsible for ensuring their apprentices are well-trained. They did their own research on the BSC courses, as well as other aspects of the training department’s proposed program. At first, the online option was a concern. However, now that the program is up and running and churning out measureable positive results, management is extremely pleased, according to Duffy.

***The online ELPW curriculum builds a core set of skills and competencies and a broad knowledge of the industry.***

One unexpected benefit of the program, Duffy said, is that the apprentices show increased confidence. Instead of tentatively lingering in the background, they’re posing intelligent questions and stepping up to their responsibilities, he said, and journeymen have told him the apprentices are asking challenging questions. Duffy stated, “The journeymen want to take the training ‘just so they can keep up!’”



“The courses in the BSC Electric Power Technology are fantastic programs, because at the same time, I’m gaining college credit hours that can be used toward a degree when I finish my apprenticeship program. It’s a win-win for both Tri-State and me.” – **Toby Doub**, *substation technician apprentice, Tri-State*

“Only halfway through the program, the apprentices are starting to demonstrate knowledge that took the journeymen five or more years to learn on the job,” said Duffy. He also stated that the current group of apprentices’ class grade average is 92% to 93%.



***EPCE's online education and training programs translate to reduced tuition assistance and training expenses.***

Another benefit of the ELPW courses is that they are attractively priced when compared to other outsourced training options, said Duffy. With 35 years of utility experience, Duffy can tell the difference between good training and bad training, “And this is good training. You can’t buy this kind of quality training off the street.”

## Relay Technician Apprenticeship Model at Xcel Energy



Xcel Energy is using courses from EPCE's and BSC's ELPW program to enhance on-the-job training for their relay technicians—the very first group at Xcel Energy to pilot it. The classes for the program include:

ELPW 112	Electrical System Components
ELPW 206	Electrical System Protection
ELPW 208	Advanced Math
ELPW 211	Substation Relays
ELPW 213	Fundamentals of Metering
ELPW 233	Single-Phase and Polyphase Metering
ELPW 250	Transformers

The course schedule for the four-year relay technician apprenticeship program includes two courses per semester for the first two years and then one class per semester for the remaining two years.

The relay technicians were chosen for the pilot of this first apprenticeship program partly because they are well-versed in an online working and learning environment—it's the nature of their jobs and each technician is equipped with a desk and laptop. The technicians in the program attribute a lot of their success to the fact that Xcel allows them time to train and do online coursework on the job.

### Results

***EPCE's programs provide online, industry-sponsored education and training that is easy to implement into apprenticeship training models.***

Utilities are finding that more people in their 20s and 30s are choosing the relay technician career path. Xcel Energy reports that 75% of their relay technicians will retire in the next five years; therefore, they plan to assign three to four apprentices to each retiring technician for training purposes.

According to the technicians in the relay apprenticeship program, benefits include:

- An increase in the number of college graduates at the company
- Stronger emphasis on the relay technician position due to the program specificity
- More freedom for students to review the material on their own time due to the flexibility of the online program

***EPCE energy industry online education is utility-specific and meets the needs of apprentices.***

The technicians' knowledge and skills are so strong, early "naysayers" are being won over, leading Xcel Energy to invest in more time and resources toward putting more relay technicians through the apprenticeship program.

"If our technicians had to travel to go to school, I believe the success rate to journeyman would be dismal," said Dave Pritekel, manager of system protection at Xcel Energy.

**NEXT STEPS: Contacting EPCE**

- Learn how your apprenticeship program can be customized with online, industry-specific Electric Power Technology courses.
- Speak with industry peers to learn how this program is benefiting their apprenticeship programs.
- Schedule an Electric Power Technology course demonstration.
- For more information, please contact Christine Carpenter at (303) 804-4663 or [ccarpenter@cael.org](mailto:ccarpenter@cael.org).

The Energy Providers Coalition for Education (EPCE) is a national alliance delivering solutions to attract and engage the energy industry's workforce through quality online education. Expanding beyond standard job training, EPCE's online programs are contextualized credit-bearing courses leading to certificates, associate's, bachelor's, and master's degrees. These programs offer interested candidates and incumbent workers technical skills as well as academic knowledge needed for industry career paths in electric utilities, nuclear power, and power engineering. EPCE members, representing over two-thirds of the industry, champion industry needs in their joint efforts to develop and sponsor online curriculum with qualified accredited colleges, and universities. This collaborative strategy ensures continued program expansion across electric utilities and the energy industry at large.

Bismarck State College's National Energy Center of Excellence offers online and classroom training for the energy industry. Associate in Applied Science (AAS) degrees can be earned, or courses can simply be taken for professional development and training. Classes are available in Electric Power Technology (distribution), Electrical Transmission Systems Technology (system operations), Power Plant, Process (refining, gasification, ethanol, biodiesel), Nuclear Power, and Renewable Generation (wind, solar, tidal, hydro, biomass) Technologies. In addition, a Bachelor of Applied Science degree in Energy Management is available entirely online. The classes are offered in a convenient block-style format, giving students the opportunity to complete a class in 3-6 weeks. The National Energy Center of Excellence is also known for their non-credit offerings such as apprenticeship programs, customized training, and NERC CEH courses.

