

Apprentice Lineworker Training

On-Site/On-Demand

Four-Year Career Development Program



Professional training
brought to you by



*Minnesota Municipal
Utilities Association*



MMUA Mission:
**To unify, support, and serve
as a common voice for municipal utilities.**



MMUA Training Center Mission Statement:
To promote, perform, and enhance safe work environments in our municipal utilities,
with the willingness to learn and pass on the passion of the craft.

MMUA Apprentice Lineworker Training

On-site program brings top-notch teaching and hands-on work to your system

The U.S. Department of Labor has predicted that almost half of the electric utility workforce plans to retire in the 2014-2019 time frame. It predicts that “employment opportunities should be particularly good for electrical power-line installers and repairers, as many workers in this field are expected to retire.”

This generational changeover is evident at many utilities—and has many utility officials concerned about how their utility will be staffed in the future. The loss of institutional knowledge is a critical concern, especially for a profession heavily dependent on mentoring and on-the-job training.



Municipal electric utilities, which often serve small, rural cities, face particular challenges in developing and maintaining a highly skilled workforce. This need for skilled employees is the primary reason MMUA developed the Apprentice Lineworker Training program.

The program is designed to bolster the ranks of municipal linemen with those most likely to make a long-term commitment to their local utility.



Municipal utilities have told MMUA that the lineman they are most likely to keep is a promising person with local roots. If that person can be hired and trained locally, there is a good chance the utility—

given good management and competitive wages—can keep that employee for many years.

“This program lets us select and train our own municipal electric lineman,” said MMUA Director of Training and Safety Mike Willetts.

- The MMUA course allows the municipal utility employee who wants to learn more about the lineman’s trade to receive professional training from experienced instructors right at the utility site.

- Program timing is flexible and hands-on work will be done primarily at your site. This allows the utility



to get a lot of work out of its employee and allows the employee to concentrate on training for approximately two days per quarter. In addition, the program includes annual ‘tuition free’ attendance, for each enrollee, to the MMUA Overhead, Underground, Transformer and Meter Schools.

Participation at these schools is expected and the hours count toward a student’s training.

- The schools provide an opportunity for students to concentrate on a technical project while gaining insight on how another utility might approach a situation. Some testing will also be done at the MMUA Training Center in Marshall, a 30-acre facility featuring overhead and underground electric systems and outdoor and indoor training areas.

- Students are given a cutting-edge academic program along with extensive hands-on training. The instruction involves classroom and outdoor hands-on activities. Safety is of prime importance.

- Apprentice linemen meet, work and talk under the tutelage of MMUA’s Apprenticeship Instructor James Monroe, a licensed journeyman lineworker with years of linework and teaching experience.

see next page please





Real training, real work, real benefits

Much of the apprenticeship training program involves work on your utility system. In some cases, two or more municipal utilities have come together to train and work on one of the municipal systems.

The program has a price, a lineman noted, but hiring a contractor to do the work was also expensive, and the local lineworkers would miss the hands-on training experience. The training/work makes lineworkers more capable and more valuable to their communities. The work also leads to a sense of accomplishment and pride in their utility system.

“MMUA is working to keep costs down while providing a quality product,” said Willetts. “We put the program on at your utility, using your equipment, in your time slot, serving your customers. It’s the best way to learn your system. It lets the apprentice who wants to learn more about the lineman’s trade receive professional training from an experienced instructor right at the utility site.”

It is also possible to save some money, by getting together with a neighboring municipal utility, similar to MMUA’s Job Training and Safety program, which focuses on training electrical workers.



The program has been approved by the U.S. Department of Labor and the Minnesota Department of Labor and Industry.

Linemen involved are uniformly appreciative of the experience. They like the training—which isn’t so much like training as working under the guidance of an experienced, linework instructor—which is what Monroe is.

Along with the hands-on training, students work on a nationally-recognized lineman’s correspondence training course. MMUA works with correspondence course providers to tailor the learning to the individual student.



Top-notch instruction

MMUA's Monroe brings first-hand experience to your training needs

In July 2018, MMUA hired James Monroe as its primary Apprenticeship Instructor and Job Safety & Training Instructor.

Monroe, a journeyman lineman, came to MMUA from New Ulm Public Utilities, where he was employed as a lineman for approximately 12 years. While at New Ulm, he performed a variety of job duties and maintained his Journeyman License to meet all regulations. He planned layout and installations, diagnosed and corrected malfunctions, operated a variety of tools and equipment, among other duties.

Monroe also participated in many MMUA schools and workshops, and served as an instructor for the Underground Schools from 2014-2017.

He also has experience in storm repair and mutual aid, and has responded to snow and ice storms and tornadoes in Minnesota and Hurricane Irma in Florida.

Monroe earned his powerline diploma from Minnesota West Community and Technical College in May 2006. Prior to that, he worked for Carr's Tree Service in Sleepy Eye from 2002-2005.



Monroe credits MMUA with influencing his career. He is looking forward to getting to know the people and the various municipal utilities around the state.

Monroe brings a commitment to maintaining and operating electrical systems for the community in the most efficient and safest way possible. He is eager to work with your utility and to contribute to the growth and development of the next generation of municipal electric linemen.

Learn from the pros

Learn from the pros in the MMUA Apprenticeship Program. For each person enrolled, tuition includes 'free' attendance to each of four annual schools at the MMUA Training Center—the Meter School, Transformer School, and the Underground and Overhead Schools.



Sign up for the MMUA Apprentice Lineworker Training Program and receive 'tuition free' attendance, annually, to the following schools:

Meter School

February

Students that attend the Meter School will be given expert instruction that will assist them in keeping the metering of their system as accurate as possible. The students will practice safe and efficient work practices.



Underground School

May

The Underground School includes a varied degree of technical training to provide an educational experience for all levels of expertise. This school is open to Apprentice and Journeyman. Classes that have been offered in the past are: Underground Maintenance, 600 Amp Connection, Cable and Fault Locating, 600 Amp Feeder Installation, and Cable Installation and Replacement.



Overhead School

September

Students have the opportunity to get first-class instruction on overhead. This school is open to Apprentice and Journeyman. Classes that have been offered in the past are Ropes and Rigging, Spacer Cable Switch Installation, Single-Phase Conversion, Overhead Maintenance, Double Circuit Conversion, and Transmission Rubber Gloving 34.5-41.6 KV.



Transformer School

December

This school is open to Apprentice and Journeyman. Comments from past attendees include: "Great class!" and "Very well taught." The school gives students a good understanding of the following topics related to transformers: basic three-phase connections, delta connection, wye connection, open delta connection, and three-phase troubleshooting. Key instructor is Scott Meinecke from IREA.



Overview of Program Courses

Basic Electrical Theory

Course Description

Students learn basic fundamentals of electrical theory.

Text and References

Basic electrical principles, applied mathematics, and the APPA Safety Manual.

Course Goals

The following goals will be addressed in this course:

1. electrical theory 101
2. applied mathematics 101
3. introduction to Northwest Lineman
4. electrical systems 101
5. first aid

Pole Climbing/Construction

Course Description

Pole climbing is optional but recommended offering. Students learn climbing techniques, free-hand and with safety strap. They also learn installation and removal of poles and line hardware.

Course Focus

Lab skills are the course focus.

Text and References

Shoemaker & Mack, "The Lineman's and Cableman's Handbook," latest edition, McGraw-Hill Publishing Co. Applicable Module NLC/PDP program.

Course Goals

The following goals will be addressed in this course:

1. maintain pole climbing equipment
2. shape gaffs
3. inspect pole
4. sound test pole
5. tool belt safety strap replacement
6. pole quadrant
7. pole rake
8. hand line, slings
9. crossarm hitches
10. climb pole free-hand
11. climb pole safety strap method
12. frame single crossarm
13. frame double crossarm
14. install both single and double crossarms
15. hardware poles
16. dig holes
17. pull poles
18. use pole trailer
19. set poles
20. align poles



Three-Phase AC Circuits and Transformer Banking

Course Description

The wye and delta circuit fundamentals, neutral on grounded wye lines, delta lines, three-phase transformer connections using single-phase transformers.

Text and References

Shoemaker & Mack, "The Lineman's and Cableman's Handbook," latest edition, McGraw-Hill Publishing Co. Applicable Module NLC/PDP program.



Course Goals

The following goals will be addressed in this course:

1. grounded wye primary
2. three-phase circuits
3. ungrounded wye primary
4. wye circuits
5. delta circuits
6. ungrounded delta primary
7. three-phase power
8. grounded wye secondary
9. line-to-line voltage
10. line-to-neutral voltage
11. ungrounded delta secondary
12. line current
13. midpoint grounded delta secondary
14. open wye primary
15. three-phase volt amps
16. open delta primary
17. ungrounded open delta secondary
18. open connections
19. polarity markings
20. phase identification
21. balanced load
22. unbalanced loads
23. feed back
24. midpoint grounded open delta secondary
25. grounding bank



Electrical Distribution I

Course Description

The care, maintenance and use of company and personal tools. Elementary knots and use of single slings will also be covered.

Course Focus

Lab skills are the focus of this course.

Text and References

Shoemaker & Mack, "The Lineman's and Cableman's Handbook," latest edition, McGraw-Hill Publishing Co. Applicable Module NLC/PDP program.

Course Goals

The following goals will be addressed in this course:

1. frame single-phase poles
2. frame two-phase poles
3. frame three-phase poles
4. install guy dead ends
5. install down guys
6. install overhead guys
7. install ground rods
8. tie square knot
9. tie half hitch
10. install strain insulators
11. tie bowline knot
12. over current protection
13. over voltage protection
14. barrel armor



Electrical Distribution II

Course Description

The installation and change out of single-phase transformers and overhead primary and secondaries.

Course Focus

Lab skills will be the focus of this class.

Text and References

Shoemaker & Mack, "The Lineman's and Cableman's Handbook," latest edition, McGraw-Hill Publishing Co. Applicable Module NLC/PDP program.

Course Goals

The following goals will be addressed in this course:

1. install protective grounds
2. sag wire
3. install stringing blocks
4. make connections with jumpers
5. install anchors
6. tension guys
7. string single phase
8. use sag targets
9. dead-end conductor
10. armor rod conductor
11. use hand ties
12. use manufactured ties
13. string two phase and three phase lines



Electrical Distribution III

Course Description

Building overhead lines, stringing and sagging conductors, ties and tying, application of guys and guying, building OCR stations, capacitor banks, three-phase power banks, installing underground distribution lines, connecting sectional cabinets and pad-mounted transformers, tools, application. This course also covers chain saw safety, field maintenance, use of saws from an aerial device, and trimming trees.



Course Focus

Lab skills will be the focus of this class.

Text and References

Shoemaker & Mack, "The Lineman's and Cableman's Handbook," latest edition, McGraw-Hill Publishing Co. Applicable Module NLC/PDP program.

Course Goals

The following goals will be addressed in this course:

1. build single-phase overhead lines
2. build two-phase overhead lines
3. build three-phase overhead lines
4. pull angle guys
5. pull dead end guys
6. build single-phase overhead service
7. underground cable preparation tools
8. splice 15 KV URD cable
9. install 15 KV URD elbow
10. install 15 KV URD terminator
11. connect single-phase, pad-mounted transformer
12. loop system for URD
13. radial system for URD
14. install single-phase junction boxes
15. install three-phase junction boxes

16. identify and mark URD cables
17. install three-phase transformers
18. isolate, test, and ground URD cables
19. underground cable locating and fault finding
20. underground cable maintenance and safety
21. perform pole top rescue
22. perform aerial basket rescue
23. install armor rod
24. install hand ties
25. install manufactured ties
26. build capacitor bank
27. build three-phase



- overhead service
28. build open wye/open delta bank
29. build wye/delta power bank
30. build wye/wye power bank
31. describe before digging precautions
32. chain saw safety
33. use and operation of chain saw
34. use aerial line

Care & Use of Insulated Equip.

Course Description

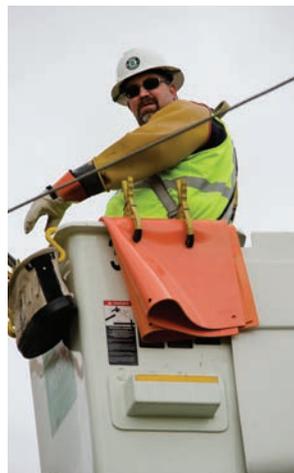
The application, care, and use of rubber goods, insulated cover-up use. Also covers transformer changeouts, cross arm changeouts, pole changeouts, and conductor transfers.

Course Focus

Lab skills will be the focus of this class.

Text and References

Shoemaker & Mack, "The Lineman's and Cableman's Handbook," latest edition, McGraw-Hill Publishing Co. Applicable Module NLC/PDP program.



Course Goals

The following goals will be addressed in this course:

- | | |
|---|---|
| 1. field test rubber gloves and sleeves | 9. describe field care of rubber gloves |
| 2. check rubber blankets | 10. use rubber gloves |
| 3. check lines hose | 11. install rubber blankets |
| 4. rubble glove dielectric test | 12. position bucket truck |
| 5. ozone effects | 13. install truck grounds |
| 6. install insulator hoods | 14. install rubber coverup |
| 7. use nylon strap hose | 15. potential coverup procedure |
| 8. describe classes of | |

16. phase-to-ground potential
17. phase-to-phase potential
18. safe working distances
19. change pin type insulator
20. change dead end suspension insulator
21. change angle suspension insulator
22. change out cross arm
23. change out dead end pole
24. cut in single-phase dead end
25. cut in three-phase dead end
26. splice out single-phase dead end
27. splice out three-phase dead end
28. transfer single-phase conductors
29. transfer three, three-phase conductors
30. use phasing sticks

Protective Equipment

Course Description

Covered in this course will be function, operation and types of fuses, circuit breakers, oil circuit reclosers and sectionalizers, types of distribution arrestors and safety.



Course Focus

Lab skills are the focus of this course.

Text and References

Shoemaker & Mack, "The Lineman's and Cableman's Handbook," latest edition, McGraw-Hill Publishing Co. Applicable Module NLC/PDP program.

Course Goals

The following goals will be addressed in this course:

- | | |
|--------------------------------------|--|
| 1. quick fuse | OCR station |
| 2. time delay fuse | 11. sectionalizer |
| 3. button type fuse | 12. fuse coordination |
| 4. link type fuse | 13. describe safety precautions |
| 5. bayonet type fuse | 14. change out oil circuit reclosers |
| 6. oil circuit breaker | 15. basic lightning arrestor |
| 7. single-phase oil circuit recloser | 16. install distribution arrestors |
| 8. three-phase oil circuit recloser | 17. lightning electrical characteristics |
| 9. build single-phase OCR station | |
| 10. build three-phase | |

Electrical Lineworker Course Review

Course Description

- Hands-on Proficiency Testing
- Final Academic Testing

Enrollment

To enroll in the Apprentice Lineworker Training program, you must be employed or sponsored by a municipal utility. Three enrollment forms need to be completed by the student: 1) MMUA Enrollment Form, 2) Commitment Form, and 3) Northwest Lineman College Enrollment Form. To request enrollment forms, please contact Rita Kelly at MMUA by email rkelly@mmua.org or telephone 763.746.0707.

Administration

MMUA's Apprentice Lineworker Training program is administered by a professional training staff with extensive electrical utility experience. MMUA maintains student registration files and payment information, as well as student records concerning program activity, completion dates, grades, and reporting official information. All course materials, lessons, texts, and supplemental material will be furnished.

Certification and Credit

Students successfully completing the program will receive MMUA's certificate of completion. In addition, students who complete the program will be credited through Dennis Merchant or Northwest Lineman College for the completion of their four-year apprenticeship program. The student will be considered a first-year journeyman lineworker.

Expectations

James Monroe, MMUA's Apprenticeship Instructor, will be at your utility approximately 2 days a quarter. Our goal is to establish a routine for scheduling training visits, though we strive to be flexible when necessary. In addition to actively participating in the training at your utility, students are expected to take an active role in the labs and task training opportunities at the MMUA Training Center.

At a minimum, students must also participate in the four "free" schools we offer. At the schools, students will be required to work as a member of a team. Attendance at the free schools is crucial and is expected of each student enrolled in this program. Outside of this instruction, students are expected to diligently pursue their studies and regularly participate in the scheduled trainings.

Additionally, students are expected to follow all applicable safety rules/regulations as required by APPA Safety Manual, NESC and OSHA 1910.269 including Subpart V. Note that each student must have a valid driver's license.

Grading and Course Evaluation

Student performance will be converted to points based on performance objectives for each class. Each class is worth a total of 1,000 points, with the exception of the "Care and Use of Insulated Equipment" and "Protective

Fee Schedule*

Pricing: year 1	
150 hours instructor time in 12 weeks: (per utility)	\$7,000
Books and supplies: (per student)	\$500
Apprenticeship program module #1 (per student)	\$602
Total:	\$8,102
Pricing: year 2	
150 hours instructor time in 12 weeks: (per utility)	\$7,000
Materials and supplies (per utility)	\$500
Apprenticeship program module #2 (per student)	\$602
Total:	\$8,102
Pricing: year 3	
150 hours instructor time in 12 weeks: (per utility)	\$7,000
Materials and supplies (per utility)	\$500
Apprenticeship program module #3 (per student)	\$602
Total:	\$8,102
Pricing: year 4	
150 hours instructor time in 12 weeks: (per utility)	\$7,000
Materials and supplies (per utility)	\$500
Apprenticeship program module #4 (per student)	\$602
Total:	\$8,102

*Fees subject to change without advance notice.

Registration fee waived, for each person enrolled, to these schools at the MMUA Training Center:

Metering School
Underground School
Overhead School
Transformer School

Total free registration: \$1,860 per year

Equipment" classes, which have 600 points possible. Grades for classroom and field work are given by the instructor. Grades are based on a student's academic ability, following instructions and safety procedures, proper handling of tools and equipment, and the ability to perform specific tasks.

Additional Information

For more information about the MMUA Apprentice Lineworker Training program and other training programs, please contact:

Mike Willetts, Director of Training and Safety
612.802.8474 cell or email: mwilletts@mmua.org



The MMUA Apprentice Lineworker Training Program includes ‘tuition free’ attendance, for each person enrolled, to each of four annual schools held at the MMUA Training Center in Marshall.

The MMUA Training Center

MMUA has developed a state-of-the-art training center in Marshall, on a 30-acre campus provided by the City of Marshall.

The Training Center affords the opportunity for high quality, hands-on, technical training in a variety of disciplines, including many aspects of electric and gas utility operations, confined space and excavation.



The Training Center includes two substations, transmission, and overhead/underground electric distribution infrastructure. A variety of indoor training can also be accommodated, including extensive metering scenarios.

MMUA regularly partners with the American Public Power Association and the Minnesota Rural Electric Association in presenting training programs. Utility workers from across the nation and around the world have received quality technical training at the MMUA Training Center.

The Training Center is located at 1004 Michigan Road, Marshall, MN 56258.





This is a partial view of the MMUA Training Center in Marshall. The address is 1004 Michigan Road, Marshall, MN 56258.

MMUA
Minnesota Municipal Utilities Association

3025 Harbor Lane N., Suite 400
Plymouth, MN 55447
Phone: 763-551-1230 or
Toll free (statewide): 1-800-422-0119
Fax: 763-551-0459
www.mmua.org

MMUA has proudly served Minnesota's municipal utilities since our founding in 1931.