

On-site/On-demand Four-Year Apprentice Lineworker Career Development Program



Professional training
brought to you by

MMUA
*Minnesota Municipal
Utilities Association*

June 2016



Our 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 On-site/On-demand Apprentice Lineworker Training

4-year program brings top-notch teaching and hands-on work to your system

The U.S. Bureau of Labor Statistics in 2009 predicted that almost half of the utility workforce planned to retire in the 2014-2019 time frame.

This phenomenon is evident at many utilities—A generation gap is forming that 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 On-Site/On-demand 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.



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



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 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 one day per month. The program includes annual ‘tuition free’ attendance, for each enrollee, to the MMUA Overhead, Underground, Transformer and Meter Schools. Some testing will also be done at the MMUA Training Center in Marshall, a 20-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.

see next page please



•Apprentice linemen meet, work and talk under the tutelage of MMUA Job Training and Safety Instructor Art Gatchell, who has nearly four decades of linework, supervisory and teaching experience.

Real training, real work, real benefits

Much of the apprenticeship training program involves work on your own utility system. In some cases, neighboring utilities that both have people in the program, come together to train and work on one municipal system.

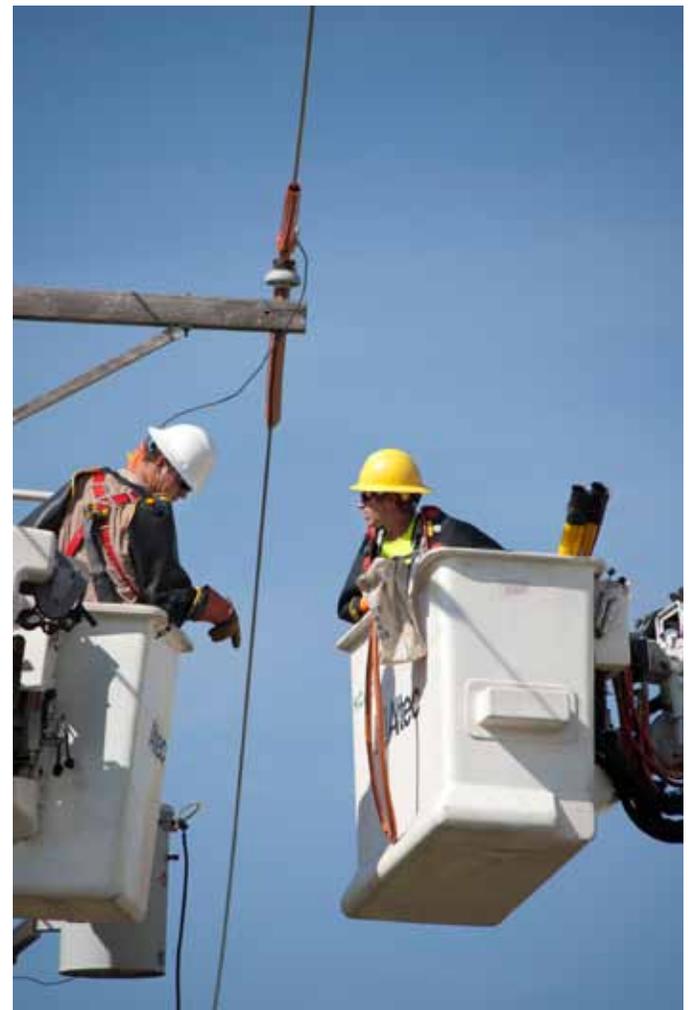
The program has a price, a lineman noted, but hiring a contractor to do the work was also expensive, and the local lineworkers would miss the hands-on training experience. The training/work makes lineworkers more capable and more valuable to their communities. The work also leads to a sense of accomplishment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

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 Gatchell is. And they like performing real work with a real benefit to a real utility.

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



For more information, call Mike Willetts

**MMUA Director of Training and Safety
612.802.8474 mwilletts@mmua.org**



Top-notch instruction

MMUA's Gatchell brings decades of experience to your training needs

Art Gatchell is MMUA's primary Job Training & Safety and Apprenticeship instructor. It is hard to imagine a person better suited to the job—Gatchell brings to the job nearly four decades worth of knowledge, experience and wisdom.

A St. Peter native, Gatchell started his utility career with the City of St. Peter. He worked there from 1978 to 1988 and left as Utilities Supervisor.

He moved to Elk River Municipal Utilities (ERMU), where he worked from 1988 to 2012 as lead lineman. At ERMU, Gatchell was the senior lead man, and duties included job training for apprentices, where he helped new graduates make a safe and successful transition onto the working crew. He oversaw safe practice for underground, overhead, bucket work and climbing.

During this time, Gatchell also instructed on overhead and underground safety training at the MMUA Training Center in Marshall.

Gatchell comes to MMUA from Xcel Energy. At Xcel, he was responsible for orientation and safety compliance for

all contractors and sub-contractors on the CapX Fargo-St. Cloud 345-kV transmission project.

Gatchell's work history includes a wide variety of responsibilities, including daily line work, training and management. He has experience in a supervisory role over water, wastewater and electric utilities. He has held water and wastewater operator licenses while in this role.

Gatchell brings to MMUA a commitment to maintaining and operating electrical systems for the community in the most efficient and safest way possible. He is eager to help you contribute to the growth and development of the next generation of municipal electric linemen.



Art Gatchell



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.

Sign up for the MMUA On-site/On-demand Four-Year 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. A key instructor is Larry Chapman from Chapman Metering.



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 Northwest Iowa Community College.



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.

1. electrical theory 101
2. applied mathematics 101
3. introduction to Northwest Lineman College
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 focus of this course.

Text and References

Shoemaker & Mack, "The Lineman's and Cableman's Handbook," 11th edition, McGraw-Hill Publishing Co., 2006. Module #1 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
21. plumb poles
22. rake poles
23. tamp 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," 11th edition, McGraw-Hill Publishing Co., 2006.

Module #1 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," 11th edition, McGraw-Hill Publishing Co., 2006. REA Bulletin 50-3 (D-804), Supt of Documents, Washington, D.C. 1983. Module #1 NLC/PDP program.

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|-----------------------------|-------------------------------|
| 1. frame single-phase poles | 8. tie square knot |
| 2. frame two-phase poles | 9. tie half hitch |
| 3. frame three-phase poles | 10. install strain insulators |
| 4. install guy dead ends | 11. tie bowline knot |
| 5. install down guys | 12. over current protection |
| 6. install overhead guys | 13. over voltage protection |
| 7. install ground rods | 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," 11th edition, McGraw-Hill Publishing Co., 2006. Module #1 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," 11th edition, McGraw-Hill Publishing Co., 2006. REA Form 806, Supt. of Documents, 1975. Module #1 NLC/PDP program.

- | | |
|--|---|
| 1. build single-phase overhead lines | elbow |
| 2. build two-phase overhead lines | 10. install 15 KV URD terminator |
| 3. build three-phase overhead lines | 11. connect single-phase, pad-mounted transformer |
| 4. pull angle guys | 12. loop system for URD |
| 5. pull dead end guys | 13. radial system for URD |
| 6. build single-phase overhead service | 14. install single-phase junction boxes |
| 7. underground cable preparation tools | 15. install three-phase junction boxes |
| 8. splice 15 KV URD cable | 16. identify and mark URD cables |
| 9. install 15 KV URD | |

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

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," 11th edition, McGraw-Hill Publishing Co., 2006. Module #1 NLC/PDP program.

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



Care and Use of Insulated Equipment

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," 11th edition, McGraw-Hill Publishing Co., 2006. Hand outs will be given out at class. Module #1 NLC/PDP program.



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

Electrical Lineworker Course Review

Course Description

- Hands-on Proficiency Testing
- Final Academic Testing

Enrollment

To enroll in the On-Site/On-demand 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 phone 763.746-0707, email rkelly@mmua.org or visit the 'Services' drop down menu at www.mmua.org and go to [safety-and-training/current offerings](#).

Administration

MMUA's On-Site/On-demand 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.

Program Expectations of Students

Students are expected to take an active role in the labs. Many classes will require the student to work as a member of a team. Attendance is crucial! Students will be expected to follow applicable safety rules as required by the APPA Safety Manual. 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 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.

Fees

A list of fees is provided on this page. The fees cover registration, administrative services, grading, text, workbooks and supplemental materials. Checks should be made payable to MMUA and should be submitted with the appropriate forms as mentioned earlier in this booklet. Fees are subject to change without notice.

Program Costs

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)	\$546
Total:	\$8,046
Pricing: year 2	
150 hours instructor time in 12 weeks: (per utility)	\$7,000
Books and supplies	\$0
Apprenticeship program module #2 (per student)	\$546
Total:	\$7,546
Pricing: year 3	
150 hours instructor time in 12 weeks: (per utility)	\$7,000
Books and supplies	\$0
Apprenticeship program module #3 (per student)	\$546
Total:	\$7,546
Pricing: year 4	
150 hours instructor time in 12 weeks: (per utility)	\$7,000
Books and supplies	\$0
Apprenticeship program module #4 (per student)	\$546
Total:	\$7,546

Free attendance, for each person enrolled, to these annual schools:

Underground School - MMUA Training Center
Overhead School - MMUA Training Center
Transformer School - MMUA training Center
Metering School - MMUA training Center
Total free tuition: \$1,700 per year

Expectations

You can expect MMUA's trainer at your utility one day a month, though we strive to be flexible, to make this program work for our members. In turn, we expect the students to attend the four MMUA schools outlined in this brochure, and to diligently pursue their studies and regularly participate in the scheduled trainings.

Additional Information

For more information about the MMUA On-Site/On-demand Apprentice Lineworker Training program and other training programs, please contact:

Mike Willetts,
MMUA Director of Training and Safety
763.746.0705 office; 612.802.8474 cell
mwilletts@mmua.org



The MMUA On-Site/On-demand 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 20-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 and underground electric distribution infrastructure. A variety of indoor training can also be accommodated, including extensive meter facilities.

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.





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 Training Center
**1004 Michigan Road
Marshall, MN 56258
Phone: 507-532-7522
Fax: 507-532-4083
www.mmua.org**