ELECTRICAL LINE WORKER TECHNOLOGY

ASSOCIATE OF APPLIED SCIENCE (AAS) – 68 CREDITS

About this program

The Electrical Line Worker Technology program provides trained personnel for the power industry. Coursework provides both theory and practical hands-on experience in all phases of power line construction and maintenance. Coursework includes electrical math, national electrical safety codes, construction of overhead and underground distribution systems, conductor applications, over-voltage and over-current protection, guying and pole grounding. The 90-acre training field located near the Wadena campus provides a site for hands-on experience in pole setting. The successful graduate is eligible for employment in rural electric and municipal utilities or with private contractors.

Program outcomes

1. Install electrical structures.
2. Interpret trade specifications and drawings.
3. Install single and multiphase overhead and underground distribution systems.
4. Demonstrate competent climbing abilities.
5. Demonstrate aerial rescue procedures.
6. Demonstrate professional safety practices, including certification in first aid and CPR.
7. Install fusing, lightning protection devices, transformers and related electrical equipment.
8. Interpret and apply the National Electric Safety Code.
9. Demonstrate professionalism and related soft skills.

Curriculum overview

Crds	Requirement type
62	Required courses
3	Restricted electives in courses
3	Restricted electives in course types
68	**Total**

Developmental courses note: A student may be required to enroll in developmental courses in reading, writing and math. A student's scores on the Accuplacer assessment will determine enrollment in developmental courses. The purpose of developmental courses is to prepare students for the demands of a college-level curriculum. *Credits may vary.*

Accreditation: Minnesota State Community and Technical College is accredited by the Higher Learning Commission, a regional accreditation agency recognized by the U.S. Department of Education. The Higher Learning Commission 230 South LaSalle Street, Suite 7-500 Chicago, IL 60604-1411 http://www.ncahigherlearningcommission.org Phone: 312.263.0456 / 800.621.7440

Curriculum requirement details

Required courses

Course	Crds
BIOL1107 - Environmental Science Issues	3
ELWT1100 - Introduction to Lineworker Theory	4
ELWT1102 - Electrical Line Worker Theory I	4
ELWT1104 - Electrical Structure Installation	5
ELWT1106 - Climbing Electrical Structure	4
ELWT1108 - Construction of Overhead Structures	3
ELWT1110 - Line Worker Theory II	4
ELWT1112 - Transformers	2
ELWT1114 - Line Construction Reports	2
ELWT1116 - Pole Top and Bucket Rescue	1
ELWT1118 - Field Construction I	3
ELWT1120 - Field Construction II	3
ELWT1134 - Hydraulics for Lineworkers	2
ENGL1101 - College Writing	3
ENST2001 - Fundamentals of Utilities	4
ENST2002 - Energy Safety Principles	1
ENST2222 - Blueprint Reading for Energy Industry	2
ENST2223 - GPS Mapping	2
MATH1114 - College Algebra	4
PSYC1101 - Human Interaction	3
SUPL1118 - Lead and Facilitate Teams	3

Other requirements or restricted electives

3 credits from one or more of these Courses:

Course title	Credits
ELWT1122 - Field Construction III	3
ELWT1132 - Electrical Line Worker Internship	3

3 credits from these Course Types:

- General Education w/out MnTC Goals

Course summaries

BIOL1107 - Environmental Science Issues ..... ***(3 credits)***
Meets MnTC Goal Areas 2, 3 and 10. This courses involves the discussion and study of ecosystems, biodiversity, human adaptations to and modifications of those ecosystems, and current environmental problems and their possible solutions. This course includes lab-like experiences including an ecosystem observation and data analysis. This course is for non-science majors.

ELWT1100 - Introduction to Lineworker Theory ..... ***(4 credits)***
This introductory course provides the student with knowledge of electrical theory including atomic structure, Ohms law, and series and parallel circuits. This course also includes some hands-on dealing with the terminating of underground wire and rigging of ropes used in the electrical lineworker industry.

ELWT1102 - Electrical Line Worker Theory I ..... ***(4 credits)***
This course provides the student with basic electrical theory involved in the production and use of electrical energy. In addition, the student practices basic direct current circuitry calculations and rigging skills including basic knots and splices pertaining to the electrical industry.

ELWT1104 - Electrical Structure Installation ..... ***(5 credits)***
This course provides the student with the introductory knowledge and skills necessary to properly install electrical structures with hand tools and with mechanized structure installation machinery.

ELWT1106 - Climbing Electrical Structure ..... ***(4 credits)***
This course provides the student with the knowledge and skills to safely climb and frame various electrical structures to heights of 50 feet. Topics include free-hand and safety-strap climbing, and installation and removal of pole line hardware.

ELWT1108 - Construction of Overhead Structures ..... ***(3 credits)***
This course provides the student with the technical understanding and skill necessary to construct overhead high voltage structures. Topics include interpretation of industry specification manuals, identification of overhead hardware, construction techniques and tool use.

ELWT1110 - Line Worker Theory II ..... ***(4 credits)***
This course provides the study of the principles of alternating current high voltage distribution circuitry. Included in this course are mathematical computation of AC power, conductor application including practice at armor rodding, hand and pre-formed ties, overvoltage and overcurrent installations, and street lighting circuits.

Prerequisites:

- ELWT1102

ELWT1112 - Transformers ..... ***(2 credits)***
This course provides the student with the knowledge and skills necessary for mounting and connecting transformers to primary and secondary systems. The course will also cover paralleling of closed and open banks.

Prerequisites:

- ELWT1108

Corequisites:

- ELWT1110

ELWT1114 - Line Construction Reports ..... ***(2 credits)***
This course provides the student with an understanding of the design of line work construction drawings and equipment installation orders.

Prerequisites:

- ELWT1108

ELWT1116 - Pole Top and Bucket Rescue ..... ***(1 credits)***
This course provides the student with an understanding of procedures necessary to complete a rescue of a line worker disabled while on a pole or in an aerial device.

Prerequisites:

- ELWT1106

ELWT1118 - Field Construction I ..... ***(3 credits)***
This course covers the installation of single-phase high voltage systems under actual field conditions. The overhead construction component of the course includes structural assembly, including grounding requirements, guying, conductor installation including stringing and tying, single-phase transformer, capacitor and regulator installation. The second component of the course is underground installation, covering trencher operation, primary and secondary cable termination, services, pad mount transformers and sectionalizing cabinets, and street lighting.

Prerequisites:

- ELWT1106

ELWT1120 - Field Construction II ..... ***(3 credits)***
This course covers the installation of multi-phase high voltage systems under actual field conditions. The overhead section will cover structure assembly including grounding, structural guying, conductor installation including stringing and tying, multi-phase transformer installation, capacitor installation, regulator installation, and the use of protective cover-up material and hot sticks. The underground section will cover multiple cable installation, primary and secondary cable termination, three-phase pad mount transformer installation and multi-phase sectionalizing cabinet installation.

ELWT1134 - Hydraulics for Lineworkers ..... ***(2 credits)***
This course provides knowledge and safe use of hydraulic and pneumatic tools used in the electrical lineworker industry.

ENGL1101 - College Writing ..... ***(3 credits)***
Meets MnTC Goal Area 1. This is an introductory writing course designed to prepare students for later college and career writing. The course focuses on developing fluency through a process approach, with particular emphasis on revision. Students will consider purpose and audience, read and discuss writing and further develop their own writing processes through successive revisions to produce polished drafts. Coursework will include an introduction to argumentative writing, writing from academic sources and a short research project.

Prerequisites:

- Completion of ELL1085, ENGL0096, or ENGL0097 with a grade of C or higher OR placement into college-level English.

ENST2001 - Fundamentals of Utilities ..... ***(4 credits)***
This course provides a general overview of the electric, gas and telecommunications industries. The course will cover fossil fuel and renewable energy sources for electric power generation, its history and projected needs for the future. The course also covers the natural gas utility from the ground to the consumers, its history and projected needs for the future. Also covered are the telecommunications industry and how the land phone and cell phone systems operate.

ENST2002 - Energy Safety Principles ..... ***(1 credits)***
This course is designed to explore the principles and practices of health and safety in an energy services-related construction environment. Topics covered in this course include personal protective equipment, safe work practices, hazardous materials, employee protection and regulations of the Environmental Protection Agency (EPA), Occupational Safety and Health Act (OSHA) and pertinent safety codes/standards.

ENST2222 - Blueprint Reading for Energy Industry ..... ***(2 credits)***
This course will introduce students to reading and interpreting system and strand maps for the gas, electric and communication industry. Students will also be introduced to reading building blueprints and staking and pole framing sheets.

ENST2223 - GPS Mapping ..... ***(2 credits)***
This course covers basic information to help the student understand GPS uses in the utility industries, data collection options, processing the collected data and field procedures used to plan a utility distribution route.

MATH1114 - College Algebra ..... ***(4 credits)***
Meets MnTC Goal Areas 2 and 4. This course includes rational, polynomial, exponential, logarithmic, inverse and quadratic functions. The course also includes equations, inequalities, complex numbers and systems of linear equations. Additional topics may include matrices and determinants.

Prerequisites:

- MATH1020

OR

- Placement Exam

PSYC1101 - Human Interaction ..... ***(3 credits)***
Meets MnTC Goal Areas 2 and 5. This is an introductory course emphasizing practical applications of psycho-social concepts, with specific emphasis on personality development, human relations and motivation. This course is applicable for students in occupational and health-related fields or general education.

SUPL1118 - Lead and Facilitate Teams ..... ***(3 credits)***
This course will address the role of supervisor, manager and leader as a leader and facilitator of work teams. Topics will include planning work teams, creating effective team interaction, identifying characteristics of successful teams and demonstrating skills and behaviors of both team leader and team member.

ELWT1122 - Field Construction III ..... ***(3 credits)***
This course gives the student a basic understanding of overhead transmission structure construction and installation requirements for 69KV systems. Students will also participate in two industry hot line schools, one sponsored by the Minnesota Municipal Utilities Association and the other by the Minnesota Rural Electric Cooperatives.

ELWT1132 - Electrical Line Worker Internship ..... ***(3 credits)***
In this course, the student will learn apprentice line work skills under the supervision of an appropriate industry representative.

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Program Plan — "Primary"

Locations: Wadena

1st Fall Term (13 credits)

Courses

Course	Crds
BIOL1107 - Environmental Science Issues	3
ENGL1101 - College Writing	3
ENST2002 - Energy Safety Principles	1
ENST2222 - Blueprint Reading for Energy Industry	2
MATH1114 - College Algebra	4

1st Spring Term (18 credits)

Courses

Course	Crds
ELWT1100 - Introduction to Lineworker Theory	4
ELWT1134 - Hydraulics for Lineworkers	2
ENST2001 - Fundamentals of Utilities	4
ENST2223 - GPS Mapping	2
PSYC1101 - Human Interaction	3
SUPL1118 - Lead and Facilitate Teams	3

2nd Fall Term (19 credits)

Courses

Course	Crds
ELWT1102 - Electrical Line Worker Theory I	4
ELWT1104 - Electrical Structure Installation	5
ELWT1106 - Climbing Electrical Structure	4
ELWT1108 - Construction of Overhead Structures	3

3 credits in one or more of the following:

General Education w/out MnTC Goals

2nd Spring Term (18 credits)

Courses

Course	Crds
ELWT1110 - Line Worker Theory II	4
ELWT1112 - Transformers	2
ELWT1114 - Line Construction Reports	2
ELWT1116 - Pole Top and Bucket Rescue	1
ELWT1118 - Field Construction I	3
ELWT1120 - Field Construction II	3

3 credits in one or more of the following:

ELWT1122 - Field Construction III 3
ELWT1132 - Electrical Line Worker Internship 3