



Program Description

WIND TURBINE TECHNICIAN ACADEMY

Kalamazoo**VALLEY**[™]
community college

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community college

In partnership with:



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WIND TURBINE TECHNICIAN ACADEMY

PROGRAM OVERVIEW

Kalamazoo Valley Community College has established the nation's leading training center for wind turbine technicians. With 85% of the course content being taught through hands-on learning, the Wind Turbine Technician Academy is the only competency based program which has earned certification by the Bildungszentrum für Erneuerbare Energien (BZEE) Renewable Energy Education Center. The BZEE is recognized internationally as the premier training provider for Wind Turbine Technicians in Europe and North America.

Kalamazoo Valley is also an active member of the American Wind Energy Association (AWEA) and participates on many committees which promote skills and safety in the industry.

The Wind Turbine Technician Academy at Kalamazoo Valley provides a fast track to high demand/high pay jobs. Because the program was created in partnership with wind turbine manufacturers, wind energy employers, plus logistics and maintenance firms, the training content is exclusively focused on teaching the skills and abilities needed for employment.

Wind Turbine Technicians are employed by turbine manufacturers and firms that provide operational and maintenance services, as well as construction companies.



With the push in this country to generate 20% of our energy with wind by 2030, the demand for highly trained technicians will only increase. Technician starting salaries range from \$45,000 to \$54,000 annually before overtime and benefits. The work requires technicians to be willing and able to travel at the direction of their company. The work follows service contracts which cover predicted maintenance, as well as unplanned service. One Wind Turbine Technician is needed for every 10 to 15 turbines.



TRAINING METHODS

Wind turbine technicians install, inspect, troubleshoot, and repair wind turbines and turbine internal and external components such as programmable controllers, gearboxes, drive components, structural components, electronic equipment, and electrical components. They review related manuals, blueprints, and schematic diagrams to determine the tasks, tools, equipment, and parts needed to maintain a highly automated system.

Unlike other national wind turbine technician training programs, hands-on experience and field work are critical components of the academy. The campus provides a 100-foot training tower for direct hands-on experience and ENSA Global Wind Organisation - Basic Safety Training (GWO_BST) certified safety training. Students develop and practice skills on turbines in the lab and use an industrial crane to develop rigging and craning skills.

An educational partnership with Heritage Sustainable Energy provides students with direct experience performing hands-on work on industry turbines. The program's trainees perform scheduled maintenance on one Vestas V44 (660 KW), two Fuhrländer FL2500 (2.5 MW), and multiple Senvion MM92 (2 MW) turbines. As the only College Instructional Partner with ENSA North America in the Midwest region, Kalamazoo Valley provides students with the skills and certifications to be job ready in twenty-four weeks or less.



27 college credits can be awarded to graduates who demonstrate the required certifications.

INDUSTRY EXPECTATIONS FOR WIND TURBINE TECHNICIANS

Graduates earn a certificate of completion from Kalamazoo Valley Community College. Certification by the BZEE as a Wind Turbine Technician can be earned upon successful completion of the course, a passing score on 6 written examinations, 7 practical examinations, and the completion of field experience. A transcript of competency is awarded to each student based on the specific competencies they demonstrate.

These competencies include:

- GWO Basic Safety Training
- Personal Protective Equipment
- Safety Data Sheets/Right-to-Know
- Driver's Safety
- NFPA 70E Arc Flash Training
- Electrical Safety
- Lock Out/Tag Out for Power Generation
- Confined/Enclosed Space Operation and Rescue
- Hazard Awareness and Mitigation Strategies
- Powered Industrial Truck Operator Training
- OSHA 10 for General Industry - Wind Energy Focused
- MEDIC First Aid with CPR/AED - Adult
- Crane and Rigging - Basic Safety and Signaling
- Tower Field Service
- Yaw System Field Service
- Nacelle Field Service
- Generator Replacement
- Generator - Bearing Replacement
- Generator Slip Ring Service
- Gear Box - Service and Inspection
- Hydraulic Troubleshooting
- Hydraulic Accumulator
- Hydraulic Torque Wrench
- Hydraulic Bolt Tensioning
- Precision Measurement
- Manual Torque Tools
- Laser Shaft Alignment
- Vibration Measurement
- Thermography
- Brake Maintenance
- Brake System - Caliper Disassembly, Assembly, & Overhaul
- Blade Inspection/Documentation
- Sensors/Controllers
- PLC - Programming and General Troubleshooting
- Use of Multimeter
- Use of Oscilloscope
- Use of Megger
- Read IEC Diagrams
- Sensor Operation and Diagnosis
- Construct Motor Controls Circuits
- Diagnose Motor Control Circuits
- AC Motors



WIND TURBINE TECHNICIAN ACADEMY

ADMISSION TO THE PROGRAM

The Wind Turbine Technician Academy is designed to prepare students for a specific occupation. Unlike more generalized educational programs, this training opportunity is not likely to benefit students who do not intend to pursue employment as a wind turbine technician or enter an industry which uses highly technical electrical and mechanical skills.

The Wind Turbine Technician Academy accepts students into the program by using a screening process which aligns with the requirements of industry employers. The application process identifies students with **pre-requisite knowledge and experience** needed for success in the Academy and to assure graduates have the skills, characteristics, and capabilities employers require for hire.

Satisfactory completion of a climb test at the start of the Academy

A climb test is completed on the first day of class on the 100-foot training tower.

Ability to travel and/or relocate upon accepting employment

Wind Turbine Technicians must be willing to go to locations where wind generation facilities are being constructed, where maintenance is to be performed, and to turbines in need of emergency repair. Overtime is common in this occupation and crews must be easily assembled and dispatched to respond to emergencies.

Must possess a valid Driver's License

Wind Turbine Technicians commonly are required to drive company owned vehicles. Admission to the Wind Turbine Technician Academy therefore requires a photo copy of a valid driver's license. Employers may further scrutinize driving and arrest records as this can affect the ability to provide insurance for their employees. Candidates for the Wind Turbine Technician Academy should carefully consider their driving record and know that employment options may be negatively affected if they have a high number of points or driving related offenses, such as DUI (driving under the influence), DWI (driving while impaired), or refusal to test in the past five years.

Ability to pass a pre-employment drug test and background screening

Wind Energy companies may require employees to meet specific background requirements for employment. Certain felony offenses severely limit employment eligibility.

Weight cannot exceed 260 pounds

Work performed by Wind Turbine Technicians requires the use of Personal Protective Equipment (PPE). The average weight of equipment carried by a Wind Turbine Technician is 50 pounds. PPE is rated for no more than 310 pounds. Weight + Equipment must equal less than 310 pounds.



Medically fit

A Physician's Statement must verify the candidate is able to:

- Work in an indoor or outdoor environment, in adverse and confined spaces, and in extreme weather conditions including cold weather, heat, wind, pollen, dust, grasses, and weeds.
- Use close range radios for communication.
- Move and manipulate up to 50 pounds.
- Demonstrate visual acuity which includes depth perception, field of vision and the ability to distinguish between colors.

Experience in a mechanical or electrical field of work

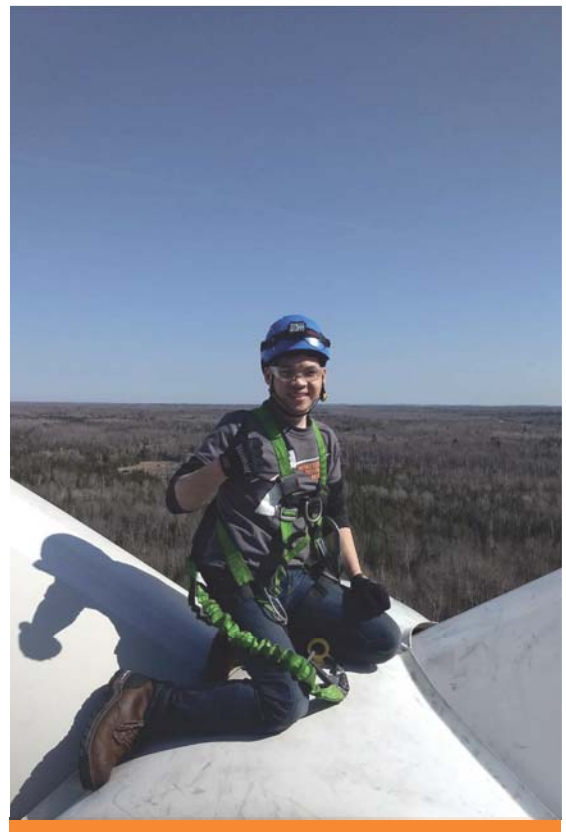
This criterion is typically satisfied through work experience in a field where the use of tools, mechanical and/or electrical equipment is required. Experience in the military, as an intern, participation in an educational program, apprenticeship, and other experiential work will be considered.

Evidence to support communication and teamwork skills

The work environment for Wind Turbine Technicians requires small groups of workers in remote areas to work in harmony for the purpose of completing the tasks required and to assure the safety of each individual. Team work, the ability to work well with others, capability to make decisions which require critical thinking, and ability to develop trust are key requirements for the job. References play a key role in verifying these characteristics.

Possess a working knowledge of Algebra, speak and read the English language

English is the international language of wind. Algebra skills are required to perform the calculations necessary for the program curriculum and for work in the field. Wind Turbine Technicians are responsible for creating written documentation for their work in the field. Applicants will be required to achieve a minimum score on a math test. Online tutoring is provided for the 9 areas of Algebra represented in the test.





WIND TURBINE TECHNICIAN ACADEMY

PROGRAM CONTENT

WIND ENERGY THEORY

56 Contact Hours

The units which make up this module provide a foundational knowledge of wind energy generation. Students will explore the various types of wind turbines and the history of their development. Students will gain essential knowledge of meteorology and the characteristics of wind which influence the siting and operation of wind turbines. Aerodynamic concepts are explored to explain lift and drag type machines commonly used in the wind turbine industry.

COMPUTER SKILLS

35 Contact Hours

This module assures student have the knowledge and skills necessary to utilize computer hardware and software applications used in the wind turbine industry. The students must demonstrate proficiency in the use of software for word processing, spreadsheets, and databases used to generate and deliver reports with pictures and supporting documentation included for electronic transmission. Effective email communication is required in industry and is learned and used on a daily basis as part of the course delivery.

WIND TURBINE SAFETY

130 Contact Hours

The units in this module provide classroom instruction, demonstration, and laboratory practice to assure students have the knowledge, skills and equipment to work safely in and around the wind turbines. Students will earn certifications in First Aid, CPR and the use of an AED, GWO_Basic Safety Training and Work at Height (compliant with 29CFR Part 1926 Subpart M and 29 CFR 1910 Subparts D, F, I), Fall Arrest, Rescue from Ladder, Self-Rescue, manual handling, NFPA 70E, hazard recognition, and confined space operations. Students earn OSHA 10-hour for General Industry, Overhead Crane Safety and Operations including Signalman. Forklift Operators training will be provided, along with awareness and management of ground disturbance and fire safety, including Emergency Action Plans.

HYDRAULIC SYSTEMS: FUNDAMENTALS AND TROUBLESHOOTING

150 Contact Hours

Students will study the physics of energy, work, power, and efficiency. Individual components and the theory of their operation are fully covered by the units in this module. Students must demonstrate the ability to read engineering prints and to interpret schematic symbols. Lab activities support the theoretical learning, and the students demonstrate mastery of the subject through lab exercises in which they are required to diagnose and correct hydraulic system faults.



WORK PLANNING AND BUSINESS PRINCIPLES

30 Contact Hours

These units assure students understand the critical nature of their role in the wind power generation industry by exploring business principles related to the wind energy sector. Effective team work, customer service, and work place communication skills are stressed. Skills for job searching and resume writing are delivered and mobility and passport issues are discussed.

ROTOR BLADES: INSPECTION, MAINTENANCE, AND REPAIR

10 Contact Hours

Students learn to inspect rotor blades for damages and are able to identify severity of damage to estimate repair procedures. Methods of attachment for performance enhancement systems are delivered. Competency must be demonstrated by performing actual blade inspections using industry approved methods as related to the damage severity.

ELECTRICAL FUNDAMENTALS AND WIND TURBINE ELECTRONIC SYSTEMS

270 Contact Hours

All students must demonstrate their understanding of fundamental electrical principles. This strong foundation must be mastered before proceeding into more advanced electrical and electronic topics. The units in this module address the safety rules of electricity, which must be applied throughout the course. Once electrical and electronic fundamentals are mastered, the student learns wind turbine specific electrical applications and demonstrates comprehension by performing tasks on an actual turbine control and electrical system. Motor control circuit design and construction must be mastered. PLC program design and implementation into motor control circuits, advanced troubleshooting, and electronic integration is mastered in this module. The student must demonstrate mastery by performing troubleshooting and repair on a vast variety of electrical control problems commonly found in wind turbine control systems including safety chains, power converters, pitch systems, frequency drives, CAN bus, sensors, and other systems found in wind turbines. Networks, fiber optics, and communications protocol theories are explored in this module as well.

MECHANICAL SYSTEMS

150 Contact Hours

The units in the module assure students understand the theory and physical characteristics of mechanical technology and components commonly found in wind turbines. Students must have a working knowledge of gears, bearings, seals, shafts, and couplers in order to maintain, repair, and troubleshoot. This module provides training on lubrication and cooling systems, as well as shaft alignment methods and vibration analysis. Students will explore brake system designs found in the rotor braking and yaw system braking units. Methods of blade pitch control will be explored.



WIND TURBINE MAINTENANCE

84 Contact Hours

Wind turbine mechanical and electrical theory is put into practice during this module. Units in this module are primarily laboratory based activities requiring students to demonstrate mastery of concepts related to wind turbine maintenance. Safety is put into practice using lock out/tag out procedures, and tools skills are demonstrated. Common turbine technician tasks are practiced including cleaning, environmental considerations, inspections, and adjustments. Correct documentation and accurate measurements must be demonstrated by the students as they repeatedly practice tasks. Mastery of these competencies will be measured by practical skill assessments.

UNITS OF STUDY

- Safety Concerns (Lock Out/Tag Out)
- Tools Skills (Hand and Hydraulic)
- Cleaning
- Environmental
- PLCs
- Generator Service
- Brake Service
- Pitch Service
- Yaw Service
- Tower Service
- Measurement Basics and Equipment
- Condition Monitoring
- Fasteners and Torque
- Documents, Reports, and Defects
- Gear Box Maintenance and Inspection
- Bearing Maintenance and Inspection
- Hydraulic Service and Maintenance
- Control Systems
- Supervisory Control and Data Acquisition
- Remote Diagnostics Using SCADA

FIELD WORK EXPERIENCE

This module is completed as a practicum experience on a wind farm operation. The student is required to interact with and perform the duties of an entry-level wind turbine technician. The mentor or field experience supervisor is asked to evaluate the student's performance on the job. The student must successfully fulfill the requirements of the job assignments issued to them during this period. The sponsor is asked to provide feedback into the curriculum based on the student knowledge demonstrated during the practicum period.