



Program Description

# WIND TURBINE TECHNICIAN ACADEMY

Kalamazoo**VALLEY**<sup>TM</sup>  
community college

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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 Clean Power Association (ACP), 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 companies, the training content is exclusively focused on teaching the skills and abilities needed for employment.

Wind Turbine Technicians are employed by turbine manufacturers and companies 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 \$50,000 to \$69,000 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 fieldwork are critical components of the academy. The campus provides a 100-foot training tower along with indoor climbing structures to deliver certified safety training. Students develop and practice skills on turbines in the lab and use an industrial crane to develop rigging and craning skills.

Educational partnerships with wind farm owners provides students with direct experience performing hands-on work on operational turbines. The program's trainees perform scheduled maintenance and emergency repairs on several megawatt class operational turbines throughout the State of Michigan. 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 competencies, pass all written tests, and pass all practical evaluations.*

## 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 & Basic Technical 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
- 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 process which aligns with the requirements of industry employers. The application process identifies students with **skills, characteristics, and capabilities** needed for success in the Academy and employment in the industry.

### **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. 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, 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.

### **Ability to identify mechanical and/or electrical aptitude**

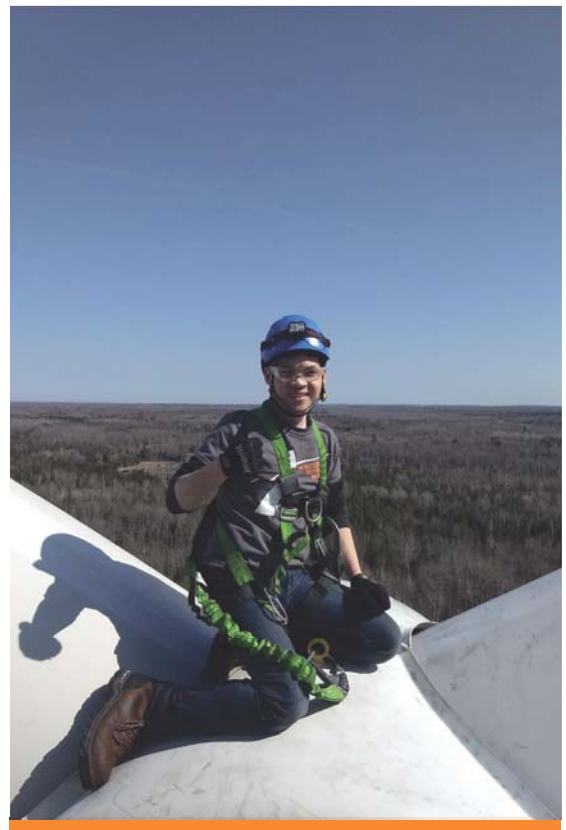
This criterion is typically satisfied through work experience in a field where the use of tools, mechanical and/or electrical equipment is required. Experience in the military, as an intern, participation in a vocational education program, apprenticeship, and any other experiential work or education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

### **Evidence to support communication and teamwork skills**

The work environment for Wind Turbine Technicians requires small groups of workers to complete tasks safely in remote areas with little to no oversight. 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.

### **Speak and read the English language**

English is the international language of wind. Wind Turbine Technicians are responsible for creating written documentation for their work in the field.





## 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 regulation strategies 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 wind turbines. Students have the opportunity to earn certifications in First Aid, CPR/AED, GWO\_Basic Safety Training and Work at Height, the ability to rescue self and others from great height and/or confined spaces, manual handling and ergonomics. Additional certifications in NFPA 70E Arc Flash, workplace hazard recognition, confined space operations, fire safety, and emergency action plans are offered. Students can also earn OSHA 10-hour for General Industry plus forklift operator, and overhead crane safety and operations.

### 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.

## 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.

## ELECTRICAL FUNDAMENTALS AND WIND TURBINE ELECTRONIC SYSTEMS

280 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.



## 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 in an operating wind farm. 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.