

This course provides an exploration of core concepts, safety practices, and practical skills for working with solar and wind systems and associated power equipment. Emphasis is placed on safe work practices for photovoltaic (PV) and wind installations, system siting and assembly, electrical measurement and instrumentation, energy storage and charging, power-conversion topics, and data acquisition for performance analysis. Students demonstrate competencies through hands-on labs, knowledge checks, and troubleshooting exercises aligned with technician best practices and industry standards.

Industry Recognized Certification Topics

- Renewable Energy Safety — Hazards unique to solar and wind systems including PV electrical system safety and fire safety.
- Power & Power Factors — Power factor (PF) definition and calculation, and relationships between resistance, impedance, and PF
- Components Familiarization — Identify and inspect PV modules, inverters, charge controllers, batteries, wind-turbine components, power converters, and generator outputs
- Measurement & Instrumentation — Use of properly rated test instruments, precision measurement best practices, and regulated power supply measurement
- Networked Data Acquisition — Data-collection hardware and software for performance monitoring
- Energy Storage & Battery Systems — Battery-bank concepts, charging and storage, charge controller operation, and safe battery handling
- Loading & Practical Applications — Constructing and testing load circuits, practical load scenarios, and use-cases for motors, fans, and lighting loads
- Troubleshooting & Diagnostics — Locate faults, data-driven troubleshooting workflows, and use of torque and measurement standards in diagnostics
- Technician Professionalism & Standards — best practices, electrical safety, tool standards, and professional workmanship expectations
- Smart-Home Installation and Monitoring – configuring multiple networked IOT devices (nodes), understanding signal basics, wired and wireless communications, cybersecurity, platform/protocol setup, system monitoring and troubleshooting

Industry Recognized Certification Competencies

- Follow established safety rules and apply safe work practices for PV and wind systems
- Recognize key electrical hazards and implement appropriate PPE and emergency response measures
- Understand PV-specific safety considerations
- Identify and inspect major components and describe their function
- Use properly rated test instruments to measure voltage, current, resistance, and continuity
- Describe true power vs apparent power, define power factor (PF), and calculate PF using circuit parameters
- Apply basic electromagnetic concepts and understand inductive reactance/CEMF in AC circuits
- Configure and test battery-bank charging and storage systems
- Assemble, wire, and load practical circuits and measure performance and verify expected behavior under load
- Install, configure and commission data acquisition hardware and software for a hybrid renewable energy system (wind and solar)
- Perform data acquisition and record lab measurements and interpret basic results for performance evaluation
- Troubleshoot common faults using systematic, data-driven methods and appropriate measurement procedures
- Demonstrate technician best practices including torque standards, precision measurement techniques

Units - 5 / Labs - 15

