

GT-1500 "Three in One" Alternative Energy Lab Overview



90 HOURS TRAINING PROGRAM

1. Basic Wind Turbine Operation

Installing and Testing a Wind Turbine

- Identify the Major Parts of the Wind Turbine
- Mounting The Wind Turbine
- Testing the Direct Output of the Wind Turbine
- Adjusting the Output of the Wind Turbine
- Document Wind Turbine Output at Various Speeds (RPM)
- Correlate Wind Power-to-Turbine Speed-to-Power Generation (Efficiency)

2. Off-Grid Wind Turbine Systems

Configuring and Testing Off Grid Installations

- Connecting the Wind Turbine to Protective/Control Devices
- Connecting the Wind Turbine to Monitoring Devices
- Connect the Wind Turbine Circuitry to Storage Batteries
 - Testing Battery Configuration Variations
- Driving a DC Load with the Wind Turbine System
 - Document Battery Charge/Discharge Rates
- Driving an AC Load with the Wind Turbine System
 - Connecting the Wind Turbine Circuitry to an AC Inverter
 - Document Battery Charge/Discharge Rates vs. Inverter Output (System Efficiency)
- Excess Capacity Management
 - Driving Auxiliary Loads

3. Wind Power Research

- Wind Turbine Types (Horizontal/Vertical)
- Local/National Wind Data
- Local Wind Turbine Legislation
- Propeller Design
- Gear Ratios/Torque
- Electric Generators
 - Motors, Generators, Alternators, Inverters
- Wind Turbine Site Strategies
- Wind Turbine Hazards
- Over-Speed Protection Designs
- Excess Energy Management

4. Wind Power System Design

Design/Create a Wind Turbine

- DC Motor/Generator/Alternator Selection
- Wind Turbine Body Design
- Propeller Blade Design
- Tower Design
- Proper Wire Size Selection

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5. Basic Solar Power Operation

Installing, Combining and Testing Solar Cells

- Testing the Direct Output of the Solar Cell
- Configuring Solar Cells to Achieve Necessary Voltage/Current/Power Requirements
- Mounting the Solar Cells to Create a Solar Panel
- Document Solar Panel Output at Various Light Intensities
- Correlate Light Intensity-to-Power Generation

6. Advanced Solar Panel Systems

Configuring, Testing and Operating Off Grid Solar Installations

- Connecting the Solar Panel to Protective/Control Devices
- Connecting the Solar Panel to Monitoring Devices
- Connect the Solar Panel Circuitry to Storage Batteries
 - Battery Configuration Variations
- Driving a DC Load with the Solar Panel System

- Document Battery Charge/Discharge Rates
- Driving an AC Load with the Solar Panel System
 - Connect the Solar Panel Circuitry to an AC Inverter
 - Document Battery Charge/Discharge Rates vs. Inverter Output (System Efficiency)
- Excess Capacity Management
 - Driving Auxiliary Loads

7. Solar Power Research

- Local/National Solar Availability Data
- Local Solar Panel Legislation
- Solar Cell Types
- Solar Cell Connections
- Solar Cell Power Generation Capabilities
- Light Concentration Strategies
 - Mirrors/Fresnel Lens'/Magnifying Lens'
- Excess Energy Management

9. Solar Power System Design

Design/Create a Solar Charging System for Portable Hand Held Devices

10. Combining Wind and Solar Power Systems

Configuring and Testing Combined Alternative Energy Systems for Off Grid Operations

- Interconnecting the Wind Turbine/Solar Panel Configuration to Protective/Control Devices
- Interconnecting the Wind Turbine/Solar Panel Configuration to Monitoring Devices
- Interconnecting the Wind Turbine/Solar Panel Configuration Circuitry to Storage Batteries
- Document Wind Turbine/Solar Panel Configuration Output at Various Wind Speeds and Light Intensity Combinations
- Driving a DC Load with the Wind Turbine/Solar Panel System
- Document Battery Charge/Discharge Rates
- Driving an AC Load with the Wind Turbine/Solar Panel System
- Connect the Wind Turbine/Solar Panel Circuitry to an AC Inverter
- Document Battery Charge/Discharge Rates vs. Inverter
- Output

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11. Connecting Alternative Power Systems to the Grid

Configuring and Testing On Grid Installations

- Connecting the Output of the Inverter to the Safety/Control Devices
- Connecting the Wind Turbine/Solar Panel Configuration Circuitry to the Existing Power System
- Document Current Flow Levels from All Sources (Including the Grid) at Different Wind Speeds and Light Intensity Combinations

12. Basic Fuel Cell Operation

Connecting a Fuel Cell for Electrical Generation

- Identify the Major Parts of the Fuel Cell
- Testing the Direct Output of the Fuel Cell
- Adjusting the Output of the Fuel Cell by Stacking

- Document Fuel Cell Output in Various Configurations
- (Serial vs. Parallel)
- Correlate Power Generation to Hydrogen Consumption (Efficiency)

13. Advanced Fuel Cell Operations

Configuring, Testing and Operating Off Grid Fuel Cell Installations

- Connecting the Fuel Cell to Protective/Control Devices
- Connecting the Fuel Cell to Monitoring Devices
- Connect the Fuel Cell Circuitry to Storage Batteries
 - Testing Battery Configuration Variations
- Driving a DC Load with the Fuel Cell System
 - Document Battery Charge/Discharge Rates

14. Fuel Cell Research

- Fuel Cell Types
- Fuel Cell Connections
- Fuel Cell Power Generation Capabilities
- Stacked Fuel Cells
- Hydrogen Source/Storage Options
- Cooling

15. Fuel Cell Application/Design

Design/Create a Fuel Cell system to power a radio controlled racecar.

16. Adding a Fuel Cell to an Alternative Power System

Connecting a Fuel Cell into Alternative Energy Systems for Off Grid Operations

- Interconnecting the Fuel Cell to the Wind Turbine/Solar Panel Configuration to Protective/Control Devices
- Interconnecting the Fuel Cell to the Wind Turbine/Solar Panel Configuration to Monitoring Devices
- Interconnecting the Fuel Cell to the Wind Turbine/Solar Panel Configuration Circuitry to Storage Batteries
- Document the Fuel Cell/Wind Turbine/Solar Panel Configuration Output at Various Wind Speeds and Light Intensity Combinations