



# APPLIED PROFESSIONAL TRAINING

A Global Leader in Technology Education

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## Technology Education in

# “CAREER CERTIFICATE - RENEWABLE ENERGY”

### COURSE INFORMATION: (Enter Specific Course Address)

Career Certificate	Course #	Total Hours	Cost	CEU's	College Credits	Dates	Time
PC100.1 EPSF1.	10.xxxA	16	\$895	1.6	2 <sup>#</sup>		
PC370 SPSDI	10.xxxA	40	\$1295	4	4 <sup>#</sup>		
PC373 SPVIC	10.xxxA	24	\$1295	2.4	3 <sup>#</sup>		
PC375 WPDI	10.xxxA	40	\$1295	4	4 <sup>#</sup>		
Total		120	\$4780	12	13 <sup>#</sup>		

# College Credit may be awarded with extracurricular activities

### Electric Power System Fundamentals

- Fundamentals of generation, transmission, distribution and consumption/metering/service connections
- System protection, control and telecommunications
- Grid operations, utility interconnection, reliability and stability

### Solar PV Systems Design & Installation

- PV energy, modules and arrays
- Grid-tie, inverters, battery backup and stand-alone systems
- Design basics, sizing, efficiency and max performance
- Installation, safety and troubleshooting analysis
- NABCEP Entry level exam proctored in class

### Wind Power Design & Installation

- System design parameters and performance analysis
- Wind turbine technology, generators, blade characteristics, dynamics and orientation fundamentals
- Grid-tie and off-grid connections, sizing efficiency and maximum performance
- Tower types, installation and safety

### Solar PV for Industrial and Commercial

- Solar PV design concepts to large industrial systems
- 3-phase power connections and NEC
- Sizing and economic analysis with large PV systems
- Mechanical support design, conduit and wiring

### Program Benefits

- NABCEP entry level solar exam proctored in class.
- ETA solar and wind certification exams proctored in class
- Course qualify for NERC CEH's (APT\_016)
- College Credits (Possible; requires project, homework and final)
- Validated knowledge in Renewable Energy Industry**



### COURSE DESCRIPTION

**Applied Professional Training (APT)** is a nationally accredited degree granting higher education institution that offers quick start certificate programs aimed to give graduates an opportunity to acquire skills oriented toward entry level positions in **Renewable Energy, Electric Power and Telecommunications Industries**. These courses are designed by industry professionals with years of knowledge and experience. **APT** courses offer recognized industry certification exams in class. Each graduate receives an **APT** career certificate that is backed by renowned agency recognitions and approvals. The US Dept of Education through the Distance Education and Training Council (DETC) approves **APT** as a degree granting institution, the International Association for Continuing Education Training (IACET) approves **APT** as a continuing education course provider and **APT** is recognized by the North American Electric Reliability Corporation as a continuing education provider who adheres to NERC Continuing Education Program Criteria (APT\_016).

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## Technology Education in

# PC100.1 "ELECTRIC POWER SYSTEMS FUNDAMENTALS"

### COURSE INFORMATION: (Enter Specific Course Address)

EPSF1	Course #	Total Hours	Cost	CEU's	College Credits	Dates	Time
PC100.1	10.xxxA	16	\$895	2	2 <sup>#</sup>		

# College Credit may be awarded with extracurricular activities

### Learning Outcomes (At the end of class, the student will be able to:)

- Describe, in general, how the electric power grid works
- Explain the roles and responsibilities of the different agencies associated with electric power systems
- Describe the terminologies used in the power industry to properly discuss thoughts and ideas with governing agencies, power company officials, engineers, technicians and electricians.
- Explain what is meant by the terms voltage, current, power and energy
- Describe the differences between real, reactive and apparent (or total) power
- Explain power system efficiency through the concept of power factor
- Describe the major types of high voltage equipment used in generation, substations, transmission, distribution, consumption, protection and system control
- Discuss the types of generation plants (i.e., steam, nuclear, solar, wind, etc.) and how they interact on the grid
- Describe the basic concepts of overhead and underground transmission and distribution facilities
- Apply basic math equations and electrical concepts
- Discuss the safety of personnel in high voltage environments

### Career Benefits

- College Credits (Possible, requires project, homework and final)
- This course qualifies for NERC Continuing Education Hours (APT\_016)
- Taught by electric power instructors who explain complex concepts in simple to understand terminology
- Enhances the skill set of the electric energy career professional
- Provides the required background for future advancement and other job opportunities



### COURSE DESCRIPTION

This course provides students with a fundamental knowledge of electric power systems operations. The course covers power generation, transmission and distribution, including household wiring and consumption. Basic electrical terminology and concepts are covered with regard to design, construction, operations, and maintenance of power systems. The student learns the basics of substation, overhead, underground and service equipment. The basics of system protective relaying and planning functions are discussed. The student is introduced to control of normal and emergency operations to give a true perspective of real time power flow.

The person interested in all aspects of renewable energy including grid tie design should attend this class. How grid tie wind and solar generation systems operate in conjunction with the big picture power grid system is explained in this course. The concept of power flow both directions through a kWh meter will be explained.

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## Technology Education in

# PC370 "SOLAR PHOTOVOLTAIC SYSTEMS DESIGN & INSTALLATION"

### COURSE INFORMATION: (Enter Specific Course Address)

SPSDI	Course #	Total Hours	Cost	CEU's	College Credits	Dates	Time
PC370	10.xxxA	40	\$1295	4	4 <sup>#</sup>		

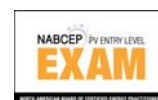
# College Credit may be awarded with extracurricular activities

### Learning Outcomes (Upon completion of this course, the student will be able to:)

- Describe the design of high quality solar systems and the components used for high efficiency
- Electricity basics, solar energy fundamentals and photovoltaic module types and fundamentals
- Designing proper size photovoltaic systems
- System component integration and understanding
- Apply solar calculations to determine whether a solar project is viable at a specific location
- Analyze performance outcomes and troubleshoot problems
- Assure proper installation and incorporate proper safety procedures
- Discuss the growing markets and applications in efficient photovoltaic systems
- Apply the benefits of solar technology to improve our economic future

### Career Benefits

- College Credits (Possible, requires project, homework and final)
- Interactive, leader-led classroom instruction from highly qualified instructors
- Demonstrations, videos and hands-on activities
- NABCEP entry level exam proctored in class prior to course completion (optional)
- ETA certified installer exam proctored in class prior to course completion (optional)



### COURSE DESCRIPTION

This course provides students with a working knowledge of Solar Photovoltaic (PV) systems. This introductory course is for individuals wanting to gain an in-depth knowledge of PV systems, design techniques, equipment functionality as well as installation components and methods. This course has some "hands on" mock installation components in a lab environment to apply visual as well as skills learned. This is for new or intermediate solar individuals wanting to gain foundational working knowledge with regard to producing high quality PV systems.

This course is designed to provide the knowledge needed to pass NABCEP's entry level exam proctored during the course and ETA's certified installer exam.. A person obtaining a passing score achievement on NABCEP's entry level exam has demonstrated basic knowledge of photovoltaic systems and design components enabling suitability within the entry level solar field.

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## Technology Education in

## PC373 SPVIC “SOLAR PV FOR INDUSTRIAL AND COMMERCIAL”

### COURSE INFORMATION: (Enter Specific Course Address)

SPVIC Series	Course #	Total Hours	Cost	CEU's	College Credits	Dates	Time
PC373 SPVIC	10.xxxA	24	\$1295	2.4	3 <sup>#</sup>		

# College Credit may be awarded with extracurricular activities

### Learning Outcomes

- Apply solar PV design concepts to industrial and commercial systems
- Analyze high demand large scale electrical consumption patterns
- Design cost effective solar PV system
- Work Safely around large solar industrial PV systems
- Apply knowledge and skills learned to a career that is associated with large scale solar PV projects
- Describe how 3-phase power is connected to large scale solar PV systems
- Describe the “Grid” and the impact large scale solar PV has on green energy objectives
- Properly determine high efficiency solar PV components for minimum system losses
- Properly design the mechanical support, conduit, and NEC wiring requirements
- Apply Performance Analysis and Troubleshooting techniques to high power solar PV

### Career Benefits

- College Credits (Possible, requires project, homework and final)
- This course qualifies for NERC Continuing Education Hours (APT\_016)
- Enhances the skill set of the solar career professional
- Taught by highly knowledgeable electric power instructors
- Provides required skills for future advancement and other job opportunities



### COURSE DESCRIPTION

This course provides students with a working knowledge of commercial and industrial size Solar Photovoltaic (PV) systems. The student is first introduced to large scales electric power system fundamentals including a discussion on the “Grid”, three-phase ac power, wye and delta, industrial electrical equipment and advanced electrical energy consumption analysis methods. This course is geared for PV designers and installers interested in learning how large scale solar PV systems are used for high energy grid tie systems.

This course includes commercial/industrial 3-phase ac electrical panels, National Electric Code, National Electrical Safety Code requirements and high voltage safety practices. Example systems are discussed in enough detail to implement large scale solar PV systems from 1kW to 1MW and higher. Special emphasis is placed on loss analysis, proper conductor sizing, power quality, special protection systems and justifiable cost effective system designs. APT’s Solar PV Introduction and Installation course is recommended as a prerequisite.

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## Technology Education in

## PC375 "WIND POWER DESIGN & INSTALLATION"

### COURSE INFORMATION: (Enter Specific Course Address)

WPDI	Course #	Total Hours	Cost	CEU's	College Credits	Dates	Time
PC375	10.xxx	40	\$1295	4.0	4 <sup>#</sup>		

# College Credit may be awarded with extracurricular activities

### Learning Outcomes (Upon completion of this course, the student will be able to:)

- Discuss how wind energy is converted to electrical energy suitable for production or consumption
- Describe how wind energy can be used for grid-tie or off-grid systems
- Explain the function of each component of micro, small and large scale wind turbines
- Discuss the benefits of various tower designs and installation requirements
- Design wind systems using components suitable for a particular location
- Apply wind energy formulas to calculate/predict available wind energy for a specific location
- Explain how to properly and safely install various size wind turbines
- Apply the benefits of wind energy to improve our economic future

### Career Benefits

- College Credits (Possible, requires project, homework and final)
- This course qualifies for NERC Continuing Education Hours (APT\_016)
- Interactive, leader-led classroom instruction from highly qualified instructors
- Demonstrations, videos and hands-on activities
- Study guide and workbooks designed for instructional use and future reference
- ETA certified installer exam proctored in class prior to course completion (optional)



### COURSE DESCRIPTION

This course teaches the fundamentals of how wind turbines work, are designed, integrated with the grid and operated. The course discusses micro turbines (under 1kW), small turbines (under 100kW) and large turbines (2.5MW). The student learns wind design parameters for system sizing, component optimization and safe construction practices. Net-metered wind installation and grid-connected wind farm scenarios are presented. The course also covers off grid battery backup system connections. The National Electric Code (NEC) and pertinent safety practices are discussed in this course. Each student will understand the function of all the component parts such as; tower, blades, nacelle, generators, pitch control, gear boxes, control schemes, power output control systems and more.

*Applied Professional Training, Inc. (APT)* offers college degrees, college credits and industry certifications to students worldwide. *APT* is a premiere technical training company in the electric power industry with over 16 years of service. *APT* is nationally accredited and recognized by the U.S. Department of Education, International Association of Continuing Education Training (IACET) for CEUs and the North American Electric Reliability Council (NERC) for CEHs. *APT* is a service company, dedicated to its students and builds long-term relationships with its customers.

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