

Review of Applied Professional Training, Inc

By Richard Romero

April 13 – 17, 2009

Course: PC270: Solar Photovoltaic Systems Introduction and Installation

Course Description *(as posted on APT's web site)*

This course provides students with a working knowledge of Solar Photo Voltaic (PV) systems. This introductory course is for individuals wanting to gain an in depth knowledge of PV systems, design techniques, equipment module functionality as well as installation requirements and methods. Students interested in clean, green, renewable energy for clean environmentally friendly applications will benefit from this NABCEP approved solar training. This solar course has some "hands on" installation activities in a lab environment to apply skills learned including the different roofing material and modules. This is for the new or intermediate installers to gain the required higher level of working knowledge for PV installations and provides the in depth step by step procedures needed to install a high quality and excellent performing PV system.

This course is designed to provide the knowledge needed to pass NABCEP's Entry Level Certification Knowledge of PV Systems exam. A person with this certification has demonstrated basic knowledge of photovoltaic systems, suitable for a supervised, entry-level position with a dealer, installer or other PV industry company.

Learning Outcomes

- PV Markets and Applications
- Working Safely with Photovoltaic Systems
- Electricity Basics, Solar Energy Fundamentals and PV Module Fundamentals
- System Components
- Designing Proper Size PV Systems
- PV System Electrical Design
- PV System Mechanical Design
- Performance Analysis and Troubleshooting

First said, overall, I was impressed with the course and the school. The staff is professional and courteous. The workbook for the class is very comprehensive and the instructor has many years of actual roof top solar PV installation experience.

For the purpose of this review, I will refer to the above course description and learning outcomes (to be referred to as "Course Outline") LINE BY LINE.

My Evaluation

This course provides students with a working knowledge of Solar Photo Voltaic (PV) systems.

The course provided this exact knowledge in a clear and thorough manner. I now possess this knowledge. Both the course manual and the instructor did well in this objective.

This introductory course is for individuals wanting to gain an in depth knowledge of PV systems, design techniques, equipment module functionality as well as installation requirements and methods.

As stated, the course is an “introductory” course. I believe several students, including myself, often placed higher expectations on the course than perhaps we should have. Many attendees were yearning for more advanced training that may have been outside the scope of this course. With that said, there are a few areas that APT should evaluate to insure the expectations stated in their “Course Outline” are met.

In depth knowledge of PV systems was provided. – Above Satisfactory

In depth knowledge of design techniques. – Less Than Satisfactory

This is perhaps my largest disappointment with the program as a whole. In my opinion, as well as a few other students I have spoken with, “In depth knowledge” was not covered sufficiently. It did not seem that we covered many different “design techniques.” Rather we discussed and reviewed three different examples over and over again. This was extremely evident upon taking the NABCEP exam. Because we reviewed a very small sampling of techniques repetitively, some of the formula based questions on the exam were puzzling or difficult to me and to many my fellow students.

Perhaps, if during the instruction, the techniques were taught using a variety of real-life examples and methods, we students would gain a better understanding of the techniques needed to design a PV system. This reminds me of how basic knowledge is learned in grade school.

I will use my 12-year old daughter as an example.

When she is challenged to learn a new math concept, the instructor/text book provides many different math problems that teach that concept. When learning to divide fractions, she is not given 3-4 problems. Rather, she is required to complete multiple pages of 20+ questions each and then reviews another 20+ questions before an exam.

So a simple fix for this area of shortcoming would be to provide multiple examples of PV design requirements and situations that we students can practice and then review.

Students interested in clean, green, renewable energy for clean environmentally friendly applications will benefit from this NABCEP approved solar training. – Good job of sharing these concepts!

This solar course has some "hands on" installation activities in a lab environment to apply skills learned including the different roofing material and modules.

– Although the lab did allow for demonstration of an installation, your lab did not provide an environment of different roofing materials or different modules. Also, the size of the lab area limited the amount of students able to participate at any one time. (A fact that the instructor constantly repeated.) The lab area needs to be larger and offer different types of PV module and roofing examples.

This is for the new or intermediate installers to gain the required higher level of working knowledge for PV installations and provides the in depth step by step procedures needed to install a high quality and excellent performing PV system.

Overall, we did learn what is promised here. We were exposed to several poor quality installations and were shown what high quality installations should be and the importance of a job well done.

An added bonus for our class was the off-site visit to an established PV system. The later discussion of wire size and loss as associated with the off-site PV system was excellent! Steven did a fantastic job in helping us understand the importance of proper wiring selections and the negative effects of using the wrong wires on both the DC and AC side of the inverter.

This course is designed to provide the knowledge needed to pass NABCEP's Entry Level Certification Knowledge of PV Systems exam.

The knowledge was presented in the class fairly well and an overall good understanding of the principles needed to pass the NABCEP exam were learned. However, as stated above, more design problem solving examples would be a benefit to the course. Passing the exam is highly important, but truly learning the principles and concepts should be paramount.

Learning Outcomes

- *PV Markets and Applications – Very Good!*
- *Working Safely with Photovoltaic Systems – Excellent!*
- *Electricity Basics, Solar Energy Fundamentals and PV Module Fundamentals – Good!*
- *System Components – Excellent!*
- *Designing Proper Size PV Systems – Needs Improvement!*
- *PV System Electrical Design – Good!*
- *PV System Mechanical Design – Excellent!*
- *Performance Analysis and Troubleshooting – Good!*

I did pass the NABCEP exam and have received my certificate.

I would like to thank our instructor Ken, for his efforts overall positive experience with the class. Also, Jeff provided additional insight that was much appreciated. Steven went above and beyond in sharing his knowledge of advanced electrical, commercial and 3-phase concepts – that I am sure would normally not be covered in a class of this scope.

Your desire to improve your course was made evident with your frequent requests for feedback from the students. It is obvious that you are open to critique and you showed, even during our week, that you would respond and react to making your school and this course the best it can be. I wish you much success in your future at becoming a premier training facility for Solar PV systems.

Sincerely,
-Richard Romero