

# Advanced PV Course

## October 4, 2010

**MON                    07:30 AM – 09:15 AM                    SESSION 1**

1. Opening Session Quiz (30 min)
2. Types of PV Systems
  - a. Stand Alone Systems
  - b. Stand Alone Hybrid Systems
  - c. Grid-Tie Systems – Residential w/ Battery Backup
  - d. Grid-Tie Systems – Residential w/out Battery Backup
  - e. Grid-Tie Systems – Commercial w/out Battery Backup
  - f. Grid-Tie Systems – Utility Scale

**MON                    09:15 AM – 09:30 AM                    BREAK**

**MON                    09:30 AM – 11:30 AM                    SESSION 2**

3. Site Analysis
  - a. Site Survey
    1. Site Analysis Tools
    2. Site Questionnaire
  - b. Preparation before a Site Visit
4. System Components
  - a. Modules
    1. Types of Modules
    2. Module Performance
  - b. Stand-Alone System Components
    1. Batteries
      - i. Types of Batteries
      - ii. Charge / Discharge Rates
      - iii. Cycle Life
      - iv. Performance Characteristics
    2. Charge Controllers
      - i. Types of Charge Controllers
      - ii. Specifications
      - iii. Performance Characteristics

**MON                    11:30 AM – 12:30 AM                    LUNCH**

**MON                    12:30 PM – 02:15 PM                    SESSION 3**

- c. Grid-Tie System Components
  - 1. Grid-Tie Inverters w / Battery Backup
  - 2. Grid-Tie Inverters w/out Battery Backup
  - 3. Commercial Grid-Tie Inverters
- d. Engineered Mounting Systems
  - 1. Residential Roof Top Rack Mount Systems
  - 2. Residential Ground Mount Systems
  - 3. Residential Pole Mount Systems
  - 4. Commercial Flat Roof Rack Systems
  - 5. Commercial Flat Roof Ballast Systems
- e. Balance of System Components
  - 1. Wire
  - 2. Wire management
  - 3. Combiner Boxes
  - 4. Disconnects
  - 5. Fuses
  - 6. Conduit

**MON                    02:15 PM – 02:30 PM                    BREAK**

**MON                    02:30 PM – 04:30 PM                    SESSION 4**

- 5. System Design Modules and Examples
  - a. Stand Alone Systems System Design and Sizing
    - 1. Load Analysis
    - 2. Battery Sizing
    - 3. Array Sizing
    - 4. Charge Controller Selection
  - b. Stand Alone Hybrid Systems System Design and Sizing
    - 1. PV + Wind Systems
    - 2. PV + Wind + Generator Systems

**TUE            07:30 AM – 09:15 AM            SESSION 5**

- c. Grid-Tie Systems – Residential w/ Battery Backup System Design and Sizing
- d. Grid-Tie Systems – Residential w/out Battery Backup System Design and Sizing

**TUE            09:15 AM – 09:30 AM            BREAK**

**TUE            09:30 AM – 11:30 AM            SESSION 6**

- e. Grid-Tie Systems – Commercial w/out Battery Backup System Design and Sizing
- f. Grid-Tie Systems – Utility Scale

**TUE            11:30 AM – 12:30 AM            LUNCH**

**TUE            12:30 PM – 02:15 PM            SESSION 7**

- 6. NEC Code Compliance
  - a. Overview of Code Requirements
  - b. Design / Sizing Example
    - 1. PV Maximum Circuit Current
    - 2. Conductor and Overcurrent Device Ampacity
    - 3. Temperature Correction
    - 4. Conduit Fill
    - 5. Terminal Temperature Check
    - 6. Voltage
    - 7. Summary Spreadsheet
  - c. Grounding

**TUE            02:15 PM – 02:30 PM            BREAK**

**TUE            02:30 PM – 04:30 PM            SESSION 8**

- 7. Financial Incentives / Rebates associated with Solar System Installation
  - a. 30% Federal Tax Credit
  - b. Commonwealth Solar II Program
  - c. Renewable Portfolio Standard (RPS) Solar Carve Out
- 8. Purchasing Option
  - a. Cash Purchase
  - b. Financed Purchase
  - c. Lease
  - d. Power Purchase Agreement

**WED**                    **07:30 AM – 09:15 AM**                    **SESSION 9**

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- 9. Overview of a Job
  - a. Customer Contact
  - b. Web Based Site Assessment
  - c. Site Visit
  - d. Quotation with Cost Justification
  - e. Financing Options
  - f. Signing the Contract

**WED**                    **09:15 AM – 09:30 AM**                    **BREAK**

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**WED**                    **09:30 AM – 11:30 AM**                    **SESSION 10**

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- 10. Engineering Package
  - a. Expedited Permit Package Format
  - b. Large Scale Permit Package / Construction Set

**WED**                    **11:30 AM – 12:30 AM**                    **LUNCH**

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**WED**                    **12:30 PM – 02:15 PM**                    **SESSION 11**

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- 11. Installation, Commissioning, and Maintenance
  - a. Safety
  - b. Installation Procedure
  - c. Commissioning Procedure
  - d. Maintenance

**WED**                    **02:15 PM – 02:30 PM**                    **BREAK**

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**WED**                    **02:30 PM – 04:30 PM**                    **SESSION 12**

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- 12. NABCEP Installer Certification
  - a. Task Analysis
  - b. Reference Material
  - c. Sample Questions

**FRI                    07:30 AM – 09:15 AM                    SESSION 13**

- 13. Site Assessment
- 14. Inspection

**FRI                    09:15 AM – 09:30 AM                    BREAK**

**FRI                    09:30 AM – 11:30 AM                    SESSION 14**

- 15. Decommission
- 16. Disassembly

**FRI                    11:30 AM – 12:30 AM                    LUNCH**

**FRI                    12:30 PM – 02:15 PM                    SESSION 15**

- 17. Reassembly
- 18. Recommissioning

**FRI                    02:15 PM – 02:30 PM                    BREAK**

**FRI                    02:30 PM – 04:30 PM                    SESSION 16**

- 19. Open Discussion