



Kennebec Valley Community College Northeast Provider of Solar Instructor Training Program Curriculum

Program Description

Kennebec Valley Community College (KVCC), acting as the Northeast Provider of Solar Instructor Training – North, is one of nine regional training providers selected by the US Department of Energy (DOE) as part of the Solar Instructor Training Network. The primary goal of this project is to help facilitate and support the creation of a well-trained and highly qualified solar energy workforce of sufficient size and diversity to meet the projected needs of the solar industry. (Additional information about DOE’s Solar Instructor Training Network can be found at:

http://www1.eere.energy.gov/solar/sunshot/instructor_training_network.html

Solar Instructor Training Network Regions and Providers



KVCC is providing regional training opportunities for educational faculty who will play a role in the installation and design of residential and commercial solar photovoltaic (PV) systems in the Northeast region. KVCC has developed partnerships with Local Educational Institutions (LEIs) to provide initial and ongoing solar PV instructor training and mentoring opportunities from 2013-2015. This network of partners is collaborating to promote the successful advancement of solar PV training within the seven state region that includes: Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island and Vermont.

This comprehensive program is helping LEIs integrate solar PV content into their existing programs. KVCC is facilitating the training and professional development of instructors through hands-on and online courses, webinars, conference calls, and other distance learning activities. KVCC is also providing mentoring relationships with instructor trainees, and coordinating the collaboration and sharing of best practices within the network.

Audience

This instructor training program is designed to match the needs of career and technical high schools, community colleges, baccalaureate institutions, trade apprenticeship and union training programs, including the following curriculum audiences:

- Electrical technology
- Construction management or building technology
- Engineering

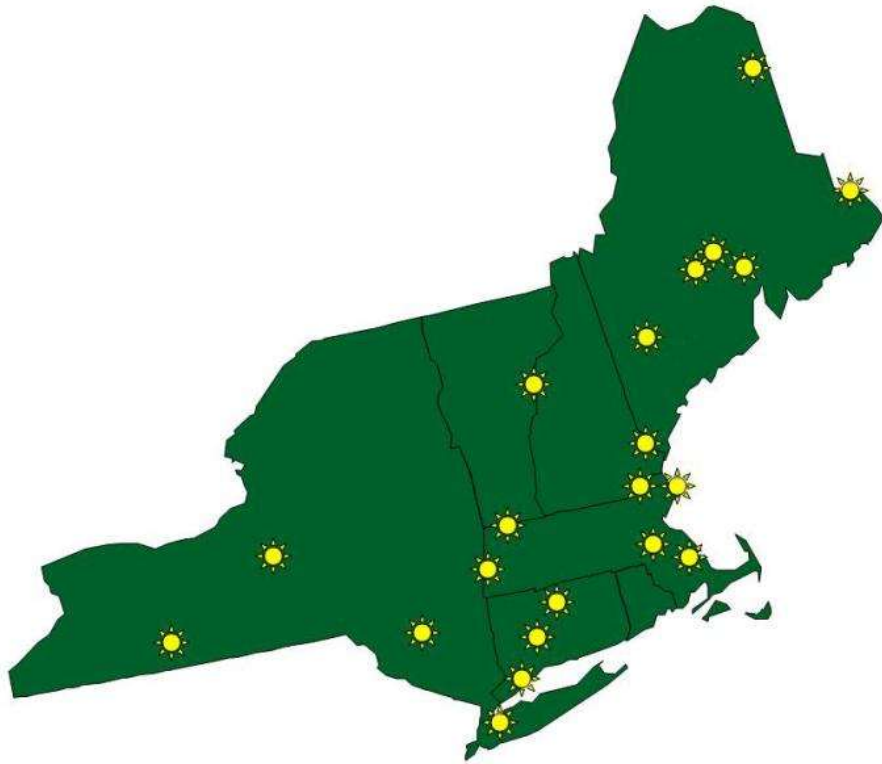
Program Details and Support

Outreach to potential participants was conducted in the winter of 2012-2013. Applications were received between January and March, 2013. Applications were evaluated based on Instructors' teaching and training experience in electrical technology, construction management, building technology, engineering or architecture. Additionally, applicants were required to participate in the full two year program and sign a long term commitment (Memorandum of Understanding – MOU) to implement the information provided through this program into an existing curriculum program. A total of 22 Instructors from 18 LEIs are participating in the program:

- [Cayuga-Onondaga BOCES](#)- Auburn, NY
- [Sullivan County Community College](#)- Loch Sheldrake, NY
- [Bramson Ort College](#)- Queens, NY
- [Riverbend Career and Technical High School](#)- Bradford, VT
- [McCann Technical Vocational High School](#)- North Adams, MA
- [Monument Mountain High School](#)- Stockbridge, MA
- [Greater Lawrence Technical High School](#)- Andover, MA
- [Gloucester High School](#)- Gloucester, MA
- [Massasoit Community College](#)- Canton, MA
- [Plymouth South High School](#)- Plymouth, MA
- [Howell Cheney Technical High School](#)- Manchester, CT
- [International Brotherhood of Electrical Workers](#)- Wallingford, CT
- [University of Bridgeport](#)- Bridgeport, CT
- [Dover High School](#)- Dover, NH
- [Oxford Hills Technical High School](#)- Norway, ME
- [Mid-Maine Technical Center](#)- Waterville, ME
- [Waldo County Technical Center](#)- Waldo, ME

- [St. Croix Regional Technical Center](#)- Calais, ME

Local Educational Institutions



Training Program Schedule

Spring Semester 2013 Dates

- **STN 010** Introduction to Solar PV (Online) April 15 – May 31, 2013

Summer Semester 2013 Attend one

- **STN 012** Intro to Solar PV for Electrical Technology Programs June 26-28, 2013
- **STN 013** Intro to Solar PV for Construction or Building Technology Programs July 17-19, 2013
- **STN 014** Intro to Solar PV for Engineering Programs August 7-9, 2013

Fall Semester 2013

- **STN 028** Instructor Mentoring (Online) Oct 1, 2013–Dec 31, 2014
- **STN 020** Integrating Solar PV into Existing Curricula (Online) Oct 18-Nov 18, 2013
- **STN 021** IREC Credentialing Pathway (Online) Nov 22-Jan 6, 2013

Spring Semester 2014

- **STN 030** Solar PV Design and Installation (Online) April 18-June 2, 2014

Summer Semester 2014 Attend one

- **STN 034** Solar PV Design and Installation for Engineering Programs
Bridgeport, CT June 24-26, 2014
- **STN 032** Solar PV Design and Installation for Electrical Technology Programs
Manchester, CT July 15-17, 2014
- **STN 033** Solar PV Design and Installation for Construction or Building Technology Programs
Loch Sheldrake, NY July 29-31, 2014

Fall/Winter/Spring Semesters 2014/2015

- **STN 038** Instructor Mentoring Site Visits Sept 2014 – June 2015

Spring 2015

- **STN 040** Best Practices for Solar PV Instruction Workshop TBD

Note: All instructor trainees are required to complete all training requirements in sequence.

Course Descriptions

STN 010 Introduction to Solar PV (Online)

Course Description

This online course is designed as a general introduction to Solar Photovoltaic (PV) technology and will help instructor trainees achieve a basic knowledge of the applications, design, installation and operation of solar PV systems. Students will learn the fundamental concepts and skills involved with becoming a solar PV instructor. The course content is consistent with the North American Board of Certified Energy Practitioners (NABCEP) Solar PV Entry Level Learning Objectives. Percentage of time spent on course topics, and the weight placed on assessment questions match the learning priority levels established by NABCEP's course and test specifications. After successful completion of this course, students are eligible to register for the optional NABCEP Solar PV Entry Level Exam. This online component is a prerequisite for each of the subsequent onsite training courses.

Contact Hours: 40 (estimated)

Note: It is the nature of online courses to allow flexibility for students to take as much time as desired to learn the course content. Actual contact time will vary for different students.

Audience

This course is designed specifically for instructor trainees within the Solar Instructor Training Network. However, the course content is presented at an introductory level, and is an important first step in preparing any audience entering the solar PV industry.

Prerequisites: None

Topical Outline

Units

0. Course and Program Overview
1. PV Markets and Applications
2. Safety Basics
3. Electrical Basics
4. Solar Energy Fundamentals
5. PV Module Fundamentals
6. System Components
7. PV System Sizing Principles
8. PV System Electrical Design
9. PV System Mechanical Design
10. Performance Analysis, Maintenance and Troubleshooting
11. Course Review and Final Assessment

STN 012 Introduction to Solar PV for Electrical Technology Programs

Course Description

This onsite course is directed toward instructors who will be teaching topics involved with the electrical installation of solar PV systems. The classroom instruction will build upon the Introduction to Solar PV online learning objectives by presenting a higher level of electrical related content consistent with NABCEP's Solar PV Installer Job Task Analysis. The course presentations, discussions and worksheets will help solidify the knowledge base and will be reinforced with hands-on training activities. KVCC's state of the art training facility and mobile training unit will provide the needed training equipment to complete this component of the program.

Contact Hours: 24

Audience

- Electrical technology instructors
- Engineering technology instructors
- Trade union instructors
- Apprenticeship program instructors

Prerequisite: STN 010

Topical Outline

Day 1

- Welcome and Introductions
- Solar Energy Fundamentals
- PV Module Fundamentals
- Workplace Safety
- Lunch
- Performing a Solar Site Assessment Lab
- System Components
- Training System Components Lab
- SITN Program Logistics

Day 2

- Electricity Basics
- Advanced Topics in Electrical Principles
- Performance Analysis, Maintenance and Troubleshooting Activities
- PV System Sizing Principles
- PV System Sizing Lab
- Lunch
- PV System Mechanical Design
- Mechanical Installation Lab – Mock Roofs

Day 3

- PV System Electrical Design
- Advanced Topics in Electrical Design
- Understanding NEC requirements for Solar PV
- Lunch
- Advanced Electrical Installation Lab – Mock Roofs
- SITN Program Logistics

STN 013 Introduction to Solar PV for Construction Management or Building Technology Programs

Course Description

This onsite course is directed toward instructors who will be teaching topics involved with the mechanical installation of solar PV systems. The classroom instruction will build upon the Introduction to Solar PV online learning objectives by presenting a higher level of construction related content consistent with NABCEP's Solar PV Installer Job Task Analysis. The course presentations, discussions and worksheets will help solidify the knowledge base and will be reinforced with hands-on training activities. KVCC's state of the art training facility and mobile training unit will provide the needed training equipment to complete this component of the program.

Contact Hours: 24

Audience

- Construction or building technology instructors
- Construction management technology instructors
- Engineering technology instructors

Prerequisite: STN 010

Topical Outline

Day 1

- Welcome and Introductions
- Solar Energy Fundamentals
- PV Module Fundamentals
- Workplace Safety
- Lunch
- Performing a Solar Site Assessment Lab
- System Components
- Training System Components Lab
- SITN Program Logistics

Day 2

- Electricity Basics
- Performance Analysis, Maintenance and Troubleshooting Activities
- PV System Sizing Principles
- PV System Sizing Lab
- Lunch
- PV System Electrical Design
- Electrical Installation Lab – Mock Roofs

Day 3

- PV System Mechanical Design
- Advanced Topics in Mechanical Installation
- Lunch
- Advanced Mechanical Installation Lab – Mock Roofs
- SITN Program Logistics

STN 014 Introduction to Solar PV for Engineering or Architecture Programs

Course Description

This onsite course is directed toward instructors who will be teaching topics involving the design of solar PV systems. The classroom instruction will build upon the Introduction to Solar PV online learning objectives by presenting a higher level of design related content consistent with NABCEP's Solar PV Installer Job Task Analysis. The course presentations, discussions and worksheets will help solidify the knowledge base and will be reinforced with design and hands-on training activities. KVCC's state of the art training facility and mobile training unit will provide the needed training equipment to complete this component of the program.

Contact Hours: 24

Audience

- Engineering instructors
- Architecture instructors
- Engineering technology instructors
- Pre-engineering instructors

Prerequisite: STN 010

Topical Outline:

Day 1

- Welcome and Introductions
- Solar Energy Fundamentals
- PV Module Fundamentals
- PV Module Design and Manufacturing
- Lunch
- Workplace Safety
- Performing a Solar Site Assessment Lab
- System Components
- Training System Components Lab
- SITN Program Logistics

Day 2

- Electricity Basics
- PV System Sizing Principles
- Advanced Topics in PV System Design
- PV System Sizing Lab
- Lunch
- PV System Electrical Design
- Advanced Topics in Solar PV Electrical Design
- Electrical Installation Lab – Mock Roofs

Day 3

- Performance Analysis, Maintenance and Troubleshooting Activities
- PV System Mechanical Design
- Advanced Topics in Solar PV Mechanical Design
- Lunch
- Mechanical Installation Lab – Mock Roofs
- SITN Program Logistics

STN 020 Integrating Solar PV into Existing Curricula (Online)

Course Description

Integrating Solar PV into Existing Curricula has been designed to assist instructor trainees accomplish their goal of integrating Solar PV content into their existing courses and/or programs. Integration may consist of augmenting existing courses or adding new solar PV courses into existing programs. This course will also introduce instructor trainees to the most successful models and strategies being implemented throughout the country. Successful completion of the course will provide each instructor trainee with a plan for integrating solar PV into their own program/s.

Contact Hours: 18

Note: *It is the nature of online courses to allow flexibility for students to take as much time as desired to learn the course content. Actual contact time will vary for different students.*

Audience: All partner instructor trainees seeking to integrate solar PV content into their existing degree programs

Prerequisites:

- STN 010
- and one of the following: STN 012, STN 013, STN 014

Topical Outline:

- Introduction and Overview (PPT Video Lesson)
 - Introduction to Solar PV Content Integration
 - Overview of Integration Strategies
- Recorded Webinars
 - Solar Content Integration by Jerry Ventre
 - <http://vimeo.com/54946509>
 - Incorporating RE Skills Into Existing Technical Programs by Andrew McMahan
 - <http://vimeo.com/50702372>
- Required Reading
 - IREC Best Practices Documents
 1. Becoming an Effective Teacher
 2. Program Development
 3. Developing a Quality Course
 4. Solar Content Integration
 5. Exemplary Solar Education & Training Programs
 6. Textbooks, References & Other Instructional Resources
 7. Labs
- Instructor Trainee Reports
 - Solar PV Integrated Program Reports
- KVCC Webinar Presenting Selected Reports

STN 021 IREC Credentialing Pathway (Online)

Course Description

This online course will introduce students to the process of obtaining Interstate Renewable Energy Council (IREC) credentials for their solar PV training program. An introduction and overview will present the important topics involved, and then a variety of successful examples will be presented. Students will then review two IREC webinars on this subject matter. Due to the complexity of the credentialing standards, reading of two IREC documents will be required. For the final report assignment, each instructor trainee will draft a proposed credentialing pathway for their own solar PV instructor/s and for their training program/s. These reports will be reviewed by the SITN solar PV instructor, and returned with any comments or suggestions. The course will conclude with a webinar hosted by KVCC. The webinar will consist of a review of the important topics, and each instructor trainee will present their proposed credentialing pathway reports.

Contact Hours: 18

Note: It is the nature of online courses to allow flexibility for students to take as much time as desired to learn the course content. Actual contact time will vary for different students.

Audience: All partner instructor trainees seeking to obtain IREC credentialing for their solar PV training programs.

Prerequisites:

- STN 010
- and one of the following: STN 012, STN 013, STN 014

Topical Outline:

- Introduction and Overview (PPT Slide Show)
 - Introduction to IREC
 - Overview of Implementation Strategies
 - Successful Examples
- Pre-Recorded IREC Webinars
 - The Value of IREC credentialing
 - <http://www.irecusa.org/irec-programs/credentialing/ispq/>
 - IREC Credentialing – webinar web link
 - <http://vimeo.com/32889559>
- Required Reading
 - Basic Guidelines for Training Curriculum
 - <http://www.irecusa.org/wp-content/uploads/ISPO-curriculum-guidelines.pdf>
 - IREC Candidate Handbook
 - <http://www.irecusa.org/wp-content/uploads/CandidateHandbook2012v8.pdf>
- Instructor Trainee Reports
 - Instructor Credentialing Pathway
 - Training Program Credentialing Pathway
- KVCC Best Practices Webinar

STN 028 Instructor Mentoring (Online)

Course Description

This online course will provide a platform for KVCC to deliver mentoring resources and activities to instructor trainees. The online course will host a public instructor discussion board (blog) and a clearinghouse for solar PV resources. Also, the KVCC solar PV instructor will be able to facilitate confidential instructor trainee discussions through private messaging to assist with the implementation of individual mentoring plans.

Audience: All partner instructor trainees

Prerequisites:

- STN 010
- and one of the following: STN 012, STN 013, STN 014

STN 030 Solar PV Design and Installation (Online)

Course Description

This online course will cover advanced principles of photovoltaic technology and how to effectively and safely incorporate PV systems into stand-alone or grid-tied electrical systems. The advanced knowledge of all aspects of solar PV design and installation will create a solid foundation for instructor trainees of all audiences. Percentage of time spent on course topics, and the weight placed on assessment questions match the category level (critical, important, or useful) and the percentage of examination questions established by NABCEP's PV Installer Job Task Analysis. Successful completion of this online component is a prerequisite for each of the subsequent onsite training courses.

Contact Hours: 24

Note: It is the nature of online courses to allow flexibility for students to take as much time as desired to learn the course content. Actual contact time will vary for different students.

Audience: All partner instructor trainees

Prerequisites:

- STN 010
- and one of the following: STN 012, STN 013, STN 014
- and one of the following: STN 020, STN 021

Topical Outline

- A. Verify System Design
- B. Managing the Project
- C. Installing Electrical Components
- D. Installing Mechanical Components
- E. Complete System Installation
- F. Maintenance & Troubleshooting

STN 032 Solar PV Design and Installation for Electrical Technology Programs

Course Description

This onsite course is directed toward instructors who will be teaching topics involved with the electrical installation of solar PV systems. The classroom instruction will build upon the topics delivered in the Solar PV Design and Installation online course by reviewing and discussing a higher level of electrical related content consistent with NABCEP's Solar PV Installer Job Task Analysis. The course presentations, discussions and worksheets will help solidify the knowledge base and will be reinforced with hands-on training activities. KVCC's state of the art mobile training unit will provide the needed training equipment to complete this onsite training course at designated regional location/s, determined by proximity to instructor trainee locations.

Contact Hours: 24

Audience

- Electrical technology instructors
- Engineering technology instructors
- Trade union instructors
- Apprenticeship program instructors

Prerequisites: STN 010, STN 012, STN 030

Topical Outline

Day 1

- A. Verify System Design
- B. Managing the Project

Day 2

- C. Installing Electrical Components
- D. Installing Mechanical Components

Day 3

- E. Complete System Installation
- F. Maintenance & Troubleshooting

STN 033 Solar PV Design and Installation for Construction Management or Building Technology Programs

Course Description

This onsite course is directed toward instructors who will be teaching topics involved with the mechanical installation of solar PV systems. The classroom instruction will build upon the topics delivered in the Solar PV Design and Installation online course by reviewing and discussing a higher level of mechanical related content consistent with NABCEP's Solar PV Installer Job Task Analysis. The course presentations, discussions and worksheets will help solidify the knowledge base and will be reinforced with hands-on training activities. KVCC's state of the art mobile training unit will provide the needed training equipment to complete this onsite training course at designated regional location/s, determined by proximity to instructor trainee locations.

Contact Hours: 24

Audience

- Construction or building technology instructors
- Construction management technology instructors
- Engineering technology instructors

Prerequisites: STN 010, STN 013, STN 030

Topical Outline

Day 1

- A. Verify System Design
- B. Managing the Project

Day 2

- C. Installing Electrical Components
- D. Installing Mechanical Components

Day 3

- E. Complete System Installation
- F. Maintenance & Troubleshooting

STN 034 Solar PV Design and Installation for Engineering Programs

Course Description

This onsite course is directed toward instructors who will be teaching topics involving the design of solar PV systems. The classroom instruction will build upon the topics delivered in the Solar PV Design and Installation online course by reviewing and discussing a higher level of design related content consistent with NABCEP's Solar PV Installer Job Task Analysis. The course presentations, discussions and worksheets will help solidify the knowledge base and will be reinforced with hands-on training activities. KVCC's state of the art mobile training unit will provide the needed training equipment to complete this onsite training course at designated regional location/s, determined by proximity to instructor trainee locations.

Contact Hours: 24

Audience

- Engineering instructors
- Architecture instructors
- Engineering technology instructors
- Pre-engineering instructors

Prerequisites:

- STN 010 *Intro to Solar PV (Online)*
- STN 014 *Intro to Solar PV for Engineering and Architecture Programs*
- STN 030 *Solar PV Design and Installation (Online)*

Topical Outline

Day 1

- A. Verify System Design
- B. Managing the Project

Day 2

- C. Installing Electrical Components
- D. Installing Mechanical Components

Day 3

- E. Complete System Installation
- F. Maintenance & Troubleshooting

STN 038 Instructor Mentoring Site Visits

Course Description

Each instructor trainee will be visited at their program's location by KVCC's SITN solar PV instructor for individual mentoring activities.

Audience: All partner instructor trainees

Prerequisites:

- STN 010
- and one of the following: STN 012, STN 013, STN 014
- and one of the following: STN 020, STN 021
- and one of the following: STN 032, STN 033, STN 034

STN 040 Best Practices for Solar PV Instruction Workshop

Course Description

This best practices workshop will serve as the capstone to the SITN training program. All instructor trainees will meet together at KVCC for a consortium to share all the information, materials, and best practices learned from their involvement and hard work within this program.

Contact Hours: 16

Audience: All partner instructor trainees

Prerequisites: Completion of all previous training requirements

Topical Outline

Units

1. Welcome and Introductions
2. KVCC Capstone Presentation
3. Partner Instructor Trainee Reports
4. Peer Review of Reports
5. Conclusions

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