REGISTERED TRAINING PROVIDERS FOR THE NABCEP® ENTRY LEVEL PHOTOVOLTAICS AND SOLAR HEATING (THERMAL) EXAMS

Please Note: This list is in alphabetical order BY STATE/Territory

USE CNTRL+F TO SEARCH FOR "ONLINE"

Please contact the provider(s) for more information about any course(s) listed below.

FACILITY/INSTITUTION	PV COURSES	SH COURSES
ALABAMA – Auburn **Smart North America** 570 Devall Drive Suite 303 Auburn, AL 36832 **Contact:** Ruth Page-Nelson **Email:** sgna@smartgridnorthamerica.com **Tele.** (800) 764-3085 smartgridnorthamerica.com	**Solar Photovoltaics** This course will provide 40 hours of training covering the NABCEP required learning objectives in preparation for the Entry Level Exam. Participants will get hands-on and classroom training. Completion of this course will result in students who are prepared to enter the field and obtain further training and experience needed to become proficient installers.	**The Entry Level Objectives for Solar water heating** introduces students to the basics of water heating in homes, commercial buildings, pools, space heating and other applications through capturing the heat from the sun, storing and transferring it for designated applications .This course covers Learning Objectives required by NABCEP: 1. Conducting a site analysis , including load analysis 2. Identifying SH safety practices, standards, codes and certification 3. Identifying systems for specific climates and applications 4. Identifying proper orientation and installation methods 5. Identifying proper use of balance of system components and materials 6. Identifying common SH maintenance items The student will be prepared to take the NABCEP Solar Heating Entry Level Exam. Achieving a passing score on the entry level exam is an indication that the candidate has demonstrated a basic knowledge of the fundamental principles of the application, installation, design and operation of Solar Heating Systems.

FACILITY/INSTITUTION	PV COURSES	SH COURSES
ARIZONA – Flagstaff **Coconino Community College** Community & Corporate Learning 2800 S. Lone Tree Rd. Flagstaff, AZ 86001 **Contact:** Alex Wright **Email:** alex.wright@coconino.edu **Tele.** (928) 526-7647 www.coconino.edu	**Photovoltaic System Installation** This course will provide an overview of the basic PV system design and application. The goal is to bridge the understanding of electrical load (from utility bill) and the PV technology with an emphasis on utility-connected residential PV system. Topics for this course: Basic electrical principles, introduction to photovoltaic systems, solar radiation, site survey and preplanning, balance of system, cells, module, array, system sizing, array mounting, utility requirements (net metering), renewable energy tax incentives, safety, tools, and the National Electric Code. In addition, off grid PV system topics include: load analysis, balance of system, charge controllers, batteries, parallel and series wiring, operation and maintenance.	
ARIZONA – Mesa **Arizona State University** College of Technology & Innovation: The Collaboratory 6075 S Williams Campus Loop W Technology Center Room 147 Mesa, AZ 85212 **Contact:** Collaboratory Coordinator **Email:** Collaboratory@asu.edu **Tele.** 480-727-1312 collaboratory.asu.edu/home	**Photovoltaic System Design and Installation** The 40 hour course will provide an overview of the basic PV system design and application. The goal is to provide an understanding of electrical loads and the ability to offset this with solar power. The emphasis will be on utility-connected residential PV systems along with a basic understanding of off-grid systems. Topics: basic electrical principles applied to PV, intro to PV systems, solar radiation, site survey and pre-planning, utility requirements, safety, specialized tools and the National Electric Code. Additional topics: cells, modules, arrays, system sizing, array construction, balance of system part, load analysis, charge controllers, batteries, selection of proper materials, operation and maintenance. Lab exercises include: electrical & site survey tools, module measurements, effects of temperature and shading, and	

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	system commissioning. After-class homework assignments will all students to further practice what was learned in class.	
ARIZONA – Phoenix **The Refrigeration School Inc.** 4201 East Washington Street Phoenix, AZ 85034 **Contact:** Sherry Jones, Executive Director **Email:** sherry.jones@rsiaz.edu **Tele.** (602) 267-4801 www.refrigerationschool.com **ONLINE Option**	**Solar Technology** This program is designed to provide students with basic knowledge of photovoltaic systems (PV), suitable for a supervised, entry level position within the PV industry. This program gives participants a greater understanding of solar technology and the: • Safety Basics • Electricity Basics • Solar Energy Fundamentals • PV Module Fundamentals • System Components • PV System Sizing • PV System Electrical Design • PV System Mechanical Design • Performance Analysis and Troubleshooting **Fundamentals of Solar (Hands-on)** This module provides an overview of photovoltaic (PV) science and an introduction to the fundamentals of solar energy. Through a combination of lecture, problem solving and hands-on lab exercises, students will learn the concepts and processes of photovoltaic systems, including their design and installation. The module covers the scope of solar energy systems conceptual, mechanical and electrical design, with an emphasis on wiring and electrical issues. 100 hours.	
ARIZONA – Scottsdale **Sonoran Desert Institute** 10245 East Via Linda, Suite 110 Scottsdale, AZ 85258 **Contact:** Pam Rogers **Email:** pamr@sdi.edu	Based upon the NABCEP learning objectives, this program provides basic knowledge of photovoltaic systems, suitable for a supervised, entry level position with a PV industry company. Topics include the key NABCEP topics of:	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Tele. (480) 314-2102 www.sdi.edu	• Safety Basics • Electricity Basics • Solar Energy Fundamentals • PV Module Fundamentals • Systems Components • PV System Sizing • PV System Electrical Design • PV System Mechanical Design • Performance Analysis and Troubleshooting	
ARIZONA – Tucson **Pima Community College** 2202 W. Anklam Road Tucson, AZ 85709 **Contact/Instructors:** *Lazaro Hong, Ph.D,* *Chien-Wei Han, Ph.D* **Email:** Lazaro.Hong@pima.edu, Chien.Han@pima.edu **Tele.** (520) 206-6603 www.pima.edu	**TEC 198T5**: Photovoltaic Installation Training: Introduction to photovoltaic energy and photovoltaic (PV) systems installation. Includes markets and applications, safety basics, electricity basics, energy efficient appliances, solar energy fundamentals, PV materials, module fundamentals, concentrators, system components, system sizing, electrical design, mechanical design and performance analysis and troubleshooting. 3 credit hours, lecture and lab. Traditional classroom with heavy hands-on component.	
ARIZONA – Tucson **Tucson Electrical Joint Apprenticeship & Training Program** 1949 W. Gardner Lane Tucson, AZ 85705 **Contact:** Karen King, Training Director **Email:** tejatp@tucsonelectricaljatp.org **Tele.** (520) 790-4690 www.tucsonelectricaljatp.org	**Photovoltaic Systems Class: Apprenticeship training:** Introduction to photovoltaic systems; solar radiation; site surveys and preplanning; system components and configurations; cells, modules and arrays; batteries; charge controllers; inverters; mechanical integration; electrical integration; utility interconnection; permitting & inspection. Traditional hands-on application and course curriculum. Held on Saturdays.	
ARIZONA – Yuma **Arizona Western College** PO Box 929 Yuma, AZ 85366-0929 **Contact:** Daniel Barajas,	**Course description pending**	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Dean of Career & Technical Education Division **Email:** daniel.barajas@azwestern.edu **Tele.** (928) 344-7769 www.azwestern.edu		
BAHAMAS, Nassau **Bahamas Technical & Vocational Institute** Old Trail Road, PO Box n-4934 Nassau, Bahamas **Contact: Elva Carey** 242-502-6380 **Email:** careye@btvi.edu.bs www.btvi.edu.bs	**Solar Electric Design Installation & BATTERY BASED FUNDAMENTALS** This course is designed to provide an overview of the three basic photovoltaic (PV) system applications, primarily focusing on grid-direct systems.	
BRITISH VIRGIN ISLANDS- Paraquita Bay, Tortola **H. Lavity Stoutt Community College** Paraquita Bay, Tottola, British Virgin Islands, VG1120 **Contact/Instructor**: Dana Lewis-Ambrose **Email:** dlewis@hlscc.edu.vg **Tele.** 1(284) 852-7035 www.hlscc.edu.vg/cpd	**Renewable Energy Training Programme** In response to the recently passed Energy Policy by the Government of the Virgin Islands in 2013, the H. Lavity Stoutt Community College provides training through a Renewable Energy Training Program with the following objective or goal in mind: "To train and certify practitioners in the fields of construction, architecture, and electrical installation with the skills to install photovoltaic systems in support of the reduction and usage of traditional power generation methods."	
CALIFORNIA **Sean White Solar** IREC Independent Master Trainer **Contact/Instructor**: Sean White **Email:** sean@pvstudent.com **Tele.** (925) 482-4176	**Entry Level Solar PV Design & Installation** Course covers the NABCEP PV Entry Level Learning objectives and the NABCEP PV Installer Task analysis. Sean White has been teaching PV full time since 2008 and received the Interstate Renewable Energy Council's 2014 Clean Energy Trainer of the Year Award. His course can be taught anywhere for	

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	anyone instructor direct. Sean has also written a book "Solar Photovoltaic Basics".	
CALIFORNIA – Aptos **Cabrillo College** 6500 Soquel Drive Aptos, CA 95003 **Contact/Instructor(s)**: Chuck Mornard, Joe Jordan, Steve Murphy **Email:** chmornar@cabrillo.edu **Tele.** (831) 423-2824	**Photovoltaic Design & Installation - CEM162PD** This is a "hands-on" course for training students and preparing them for field work.	
CALIFORNIA – Bakersfield **Kern Community College District** 2100 Chester Avenue Bakersfield, CA 93301 **Contact:** David Teasdale**,** Director, Southern Sierra Clean Energy Cooperative **Email:** dteasdal@kccd.edu **Tele.** (661) 336-5011 www.kccd.edu	**Solar Photovoltaic Entry-level Technician Training** This training program is designed to introduce the prospective students to the international photovoltaic market, which has been growing at more than 30% each year. We provide a modern, interesting approach to learning by mixing hands-on classroom participation, self-directed e-learning online, field trips, and real-world labs that fit the needs of today's busy students. Successful participants will have been provided the information necessary on safety & electricity basics, solar energy & PV module fundamentals such as wiring, inverter, & panel mounting techniques, as well as components and system sizing. We also provide necessary concepts in site surveying, grid-tie and off-grid installations, electrical and mechanical design, and instruct the student in system performance analysis and troubleshooting. The skills and knowledge gained through this training will prepare the participant to sit for the NABCEP PV Entry-Level Exam and for an entry-level job with solar energy related businesses and integrators.	

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CALIFORNIA – Bakersfield **Solar Seminars, Inc.** 4303 E Brundage Lane Bakersfield, CA 93307 **Contact:** Anne Markward, Registrar **Email**: anne@solarseminars.org **Tele.** (970) 779-8796 **www.solarseminars.org**	**PV 101: Entry Level Solar Photovoltaic Installation** Using NABCEP's ten learning objectives for the entry level PV installer, PV 101teaches students how to safely and efficiently design, situate, and install a solar electric system. We teach PV 101 in two different formats: either a traditional 5-day, classroom and practice based environment, or a blended format that combines the best of on-line, interactive learning with two days (16 hours) of hands-on installation experience.	
CALIFORNIA – Calexico **CCAC International Polytechnic Institute** 2320 M.L. King Calexico, CA 92231 **Contact:** Enrique G. Alvarado **Email** : alvaradoeg@ccac-vtc.org **Tele.** (760) 357-2995	**Electrical – 900 hours** This 900 hour Electrical course has recently been upgraded to include all 10 skills sets identified on the NABCEP Learning Objectives. (PV markets & applications, PV system electrical design, mechanical design, etc.)	
CALIFORNIA – Cotati **Sun Pirate, Inc** P.O. Box 187 Cotati, CA 94931 **Contact:** Roger Coghlan, President **Email**: ret-training@sunpirate.com **Tele. (**707) 792-6929 **www.sunpirate.com** **ONLINE Option!**		**Entry Level Solar Heating Program (Online)** **Sun Pirate's Entry Level Solar Heating Program consists of the completion of our IREC/ISPQ accredited, self paced Solar Heating System Design & Installation Online Course (60 contact hours). The student has the option to add the Entry Level SH Program which includes the initial testing fee and administration of the NABCEP SH Entry Level Exam at a Computer Based Testing (CBT) center.** **The SHSDI online course concentrates on the basics of installing solar heating systems. Students will learn practical design criteria, installation guidelines, safety issues, maintenance, and legal considerations. This is a self paced, instructor mentored online**

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		course. Primary Text *Solar Domestic Water Heating* by Chris Laughton is included. Our instructor Roger Coghlan is an ISPQ Certified Instructor.
CALIFORNIA – El Cajon **Cuyamaca College** Continuing Education & Workforce Training 900 Rancho San Diego Parkway El Cajon, CA 92019 Rita Shamoon (619) 660-4651 Rita.Shamoon@gcccd.edu www.cuyamaca.edu	**Solar PV Installation** This is an entry level, interactive course combining academic and hands on experience for a career in the solar electric "PV" industry. Beginning with the fundamentals of photovoltaic, solar radiation, site surveys, and system components, the student will learn the foundation and terms used in this field. Once the basic concepts are learned, each student has four, practical, hands on labs to apply skills which they have learned. Students will complete this course with the vocabulary and basic experience to expand their careers in the growing solar and renewable energy industry. This course results in OSHA 10 Hour Construction Safety Certification. Field trips may be required.	
CALIFORNIA – Eureka **College of the Redwoods** Dept.: Applied Technology 7351 Tompkins Hill Rd. Eureka, CA 95501 **Contact:** Julia Morrison **Email**: julia-morrison@redwoods.edu **Tele. (**707) 269-4005 **www.redwoods.edu**	A course designed to provide students with essential information and training to work with residential solar photovoltaic systems. Course content includes fundamentals of AC/DC, the National Electric Code, and principles of a residential solar photovoltaic systems. Upon successful completion of the course, students will be given the opportunity to take the NABCEP PV Entry Level Exam (North American Board for Certified Energy Practitioners, Inc.) Achievement of the NABCEP PV Entry Level Exam is a way for individuals to demonstrate that they have achieved a basic knowledge of the fundamental principles of the application, design, installation and operation of grid-tied and stand-alone PV Systems.	**Introduction to Solar Thermal Systems** **A course designed to provide students with essential information to work with solar thermal systems including system design & sizing residential projects, system components, estimating installation costs & return on investments, system maintenance & building codes. Students will be given the opportunity to sit for the NABCEP Entry Level Exam at the conclusion of the course.**

FACILITY/INSTITUTION	PV COURSES	SH COURSES
CALIFORNIA – Hopland **The Solar Living Institute** 13771 S. Highway 101 Hopland, CA 95449 **Contact:** Karen Kallen, Managing Director **Email:** karen.kallen@solarliving.org **Tele.** (707) 472-2456 **www.solarliving.org/** **ONLINE Option**	**PV 200: PV Design and Installation Intensive**. This dynamic course is an excellent five day intensive workshop that will immerse you in the ever-expanding PV market. This course will prepare you for the NABCEP entry level exam and give you practical hands-on labs to fully understand PV systems. The course covers both on and off grid PV with an emphasis on grid tied residential systems. We take care to cover every aspect of PV design installation; energy efficiency, safety, electricity basics, PV Modules, new PV Technology, Inverters, Mounting Systems, Components (BOS) and Sizing, PV Electrical and Mechanical design, Performance Analysis and Troubleshooting, and Economics of PV. This course is particularly good for those seeking employment in the PV field, but will give the homeowner a great education in PV fundamentals.	
CALIFORNIA – Imperial **Imperial Valley College** 380 East Aten Road Imperial, CA 92251-0158 **Contact:** John Fahim **Email:** john.fahim@imperial.edu **Telephone:** 760-336-1310 www.imperial.edu	**IVC Solar PV & Thermal Technician Certificate** This IVC Solar Photovoltaic & Thermal Technician Certificate program has two components and will provide students with adequate knowledge, in class and hands-on, for photovoltaic electrical systems (PV) and solar heating (SH) of water and space systems, which meets the North American Board of Certified Energy Practitioners (NABCEP) standards and learning objectives, including the following courses: Electrical Principles - Electrical Wiring and Protection - Alternative Energies - Solar PV Energy Systems - Solar PV Electrical Systems - Solar Heating - NABCEP Entry Level Exam Preparation - OSHA 30 Hrs card - Internship & Employment Readiness.	

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CALIFORNIA – Laguna Hills **Allied American University** 22952 Alcalde Drive Laguna Hills, CA 92653 **Contact:** James Parent **Email:** jparent@alliedschools.com **Telephone:** (888) 384-0849 ext.5704 www.allied.edu	**SOL200: Introduction to Photovoltaic Systems** In this course, students develop trade knowledge of photovoltaic (PV) systems based on the learning objectives for NABCEP PV Entry Level Program. Solar-electric (and other kinds of solar) technologies are introduces, along with the history and current trends in the industry. Applications and benefits of PV are explored, along with the workings of all typical components and methodologies for design of whole systems. Best practices for safety re emphasized throughout, including the use of protective equipment and ways to avoid accidents and minimize workplace hazards.	
CALIFORNIA – Livermore **Solar Universe, Inc.** Solar University, Training Division 1152 Stealth Street Livermore, CA 94551 **Contact/Instructor(s)**: Michael Hynes, VP of Training and Development **Email:** mhynes@solaruniverse.com **Tele.** (925) 455-4700 www.solaruniverse.com www.sunprotraining.com	**SunPro Tech Solar PV Installer Training** Solar University's SunPro Tech Solar PV Installer training course was designed by trade professionals to turn beginners into solar professionals in a fast and effective learning environment. The intensive immersion style training program is taught in a fully equipped solar installation vocational training facility with hands-on exercises exactly as they are experienced in the field. The SunPro course was designed with the premise that the best way to learn is by doing. During the 5-day SunPro training sessions, students work with experienced instructors to build and operated five different solar power systems. Class sizes are limited to a maximum of 20 students to guarantee the optimum instructor to student ratio throughout the hands-on exercises. The SunPro training session consists of approximately 40% classroom lecture and 60% hands-on field lab work.	

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CALIFORNIA – Los Angeles **Abram Friedman Occupational Center** 1646 South Olive Street Los Angeles, CA 90015 **Contact:** Jay Wehbe, Instructor **Email:** jmwehbe1@yahoo.com **Tele.** (213) 765-2400 x2505 **www.afoc.edu**	**Photovoltaic 1** This competency based course in solar electricity introduces students to the field of photovoltaics (PV). Students will receive instruction in solar electrical theory, PV safety, related vocabulary and terminology, types of PV systems, basic load analysis, system sizing, metering laws, and employment opportunities in the industry. The course provides a comprehensive review of the NABCEP learning objectives in order to prepare students for the NABCEP PV Entry Level Exam.	
CALIFORNIA – Los Angeles **Coast Career Institute, Inc.** 1345 South Hill Street Los Angeles, CA 90015 **Contact:** Sherry Pruett **Email:** ccisherry@sbcglobal.net **Tele.** (213) 747-6289 **www.coastcareer.com**	**Solar Installation Training:** Our program prepares students for an entry level position for installation of Photovoltaics systems. The course covers core material for photovoltaic principles, system wiring, mounting, system installation, maintenance and trouble shooting.	
CALIFORNIA – Los Angeles **East Los Angeles Skills Center** Los Angeles Unified School District 3921 Selig Place Los Angeles, CA 90031 **Contact/Instructor(s)**: Brian Hurd, Bob Bower **Email:** bhhurd@sbcglobal.net **Tele.** (323) 224-5970	**Photovoltaic Installer: Entry Level Exam Preparation:** Participants will receive instruction in solar electrical theory, PV safety, related vocabulary and terminology, types of PV systems, basic load analysis, system sizing, components and hardware, code issues, rebates and incentives, basic cost estimating, net metering laws and employment opportunities in the industry.	
CALIFORNIA – Los Angeles **Los Angeles Trade Technical College** 400 West Washington Blvd. Los Angeles, CA 90015 **Contact/Instructor(s)**: Dave Robinson, William Elarton	**ECONMT 105: Fundamentals of Solar Electricity** (Traditional classroom lecture with demonstrations) **ECONMT110: Renewable Energy Systems** (Traditional classroom lecture with demonstrations)	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Email: cdm@lattc.edu **Tele.** (213) 763-3700 college.lattc.edu/nabcep	**ECONMT205: Solar Energy Installation & Maintenance** (hands-on lab where students will install and troubleshoot operational systems)	
CALIFORNIA – Los Angeles **New Technology Training Center** 2965 Glendale Blvd Los Angeles, CA 90039 **Contact:** Hamid Kowsari, President **Email:** info@nttisite.com **Tele.** (818) 247-0989 **www.newtechtrain.com**	**Alternative Energy Practitioner:** (100 hour program with traditional classroom lecture plus hands-on exercises). This program is designed to provide a rigorous foundation of knowledge and skills for entry level PV installers. It covers basic mathematics and electrical circuit theory; solar fundamentals, PV components, and PV system design and performance simulation. We will make use of on-line tools to aid electrical and mechanical system design and system simulation. PV system design will include mechanical and electrical issues. There will be a section on NEC-compliant design including wire ampacity, grounding, component listing, interconnection and labeling; and a section on how to work with tools and OSHA workplace safety. The program will be organized around four critical tasks: (1) Sizing Systems to meet customer objectives, (2) the Site Survey, (3) Detailed System Design and Simulation, and (4) System Installation and Troubleshooting.	
CALIFORNIA – Modesto **Modesto Junior College** Technical Education Department 435 College Ave Modesto, CA, 95350 **Contact:** Andrian DeAngelis, **Email:** deangelisa@mjc.edu **Tele.** (209) 575-6088 **www.mjc.edu**	**ELTEC 321: Photovoltaic Systems:** The study of PV systems: off-grid, interconnected and hybrid. The course includes the study of PV systems, positioning, electrical and mechanical design and integration (including hands-on experiences), working safely with PV systems, financial topics (system estimate and rebates) and an overview of NABCEP certification requirements.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
CALIFORNIA – Murrieta **Ambassador Energy, Inc.** 41120 Elm Street, Ste 105 Murrieta, CA 92562 **Contact:** Steve Fulgham **Email:** **info@ambassadorenergy.com** **Tele.** (866) 586-1840 **www.mjc.edu**	**Entry Level Solar PV Design and Installation:** This course is an introduction to PV components, system design, industry codes and standards for PV system, and unique design problems and solution. Students learn how PV systems operate as well as basic system design and safety practices. The course covers basic electrical terminology, solar fundamentals, detailed discussion of system components, electrical and mechanical design considerations and OSHA safety standards. This course will prepare students for the NABCEP PV Entry Level Exam.	
CALIFORNIA – Novato **Marin Community College District College of Marin** 1800 Ignacio Blvd. Novato, CA 94949 **Contact:** Laurie Loeffler **Email:** laurie.loeffler@marin.edu **Tele.** (415) 457-8811 ext. 8108	**ELEC 139 Solar Installation and Integration:** This course is designed as an intro course targeted to entry-level installers with the intent to provide a foundation of skills in trades involved in solar installation. The course is separated into 3 distinct areas: Electrical Theory and Practice, Photovoltaic Theory and Integration, and Building Trade Skills. The program will be a balance of theory, practice and real world examples.	
CALIFORNIA – Oakland **Laney College (Peralta Community College District)** 900 Fallon Street Oakland, CA 94607 **Contact:** Stephen T. Weldon, **Email:** stweldon@peralta.edu **Tele.** (925) 451-0710	**Introduction To Photovoltaics** Theory and lab on Photovoltaic (solar) system wiring. Learn solar-safety in hands-on wiring. Learn installation practices installing solar arrays and their support systems. Learn system layout and design. Learn the Electrical Code and how it is applied to solar installations.	
CALIFORNIA – Oceanside/ Cardiff **MiraCosta College** Dept of Community Services and Business Development	ONE WEEK Entry Level Course for Solar Photovoltaic (PV) Installation & Design. Our specialized course curriculum provides the novice, or the experienced Electrical Contractor, with the required	

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1 Barnard Drive Oceanside, AZ 92056 **Contact:** Linda Kurokawa, Director **Email:** lkurokawa@miracosta.edu **Tele.** 888.895.8186 www.miracosta.edu/community **www.mccae.org**	knowledge and skills mandatory for proper solar PV system installations. We cover ALL the NABCEP required outline material with heavy emphasis in basic electricity, site evaluations, sizing the PV system properly, safety, balance of system (BOS) equipment, trouble shooting, Grid Tied and Stand Alone systems. NEC codes are reviewed and "Hands-on" training is provided. In addition, the student will be given up to date information regarding the market conditions in the Solar industry, job activities and web sites for solar professional use. Our Small Wind Energy Systems class covers NABCEP's Small Wind Task Analysis guidelines and offers an excellent opportunity to gain knowledge for hybrid Solar PV systems. We will teach you how to "APPLY" the knowledge NABCEP wants you to learn!	
CALIFORNIA – Palm Desert **College of the Desert** Applied Sciences and Business 43-500 Monterey Ave. Palm Desert, CA 92260 **Contact:** Larry McLaughlin, **Email:** lmclaughlin@collegeofthedesert.edu **Tele.** (760) 773-2595 www.collegeofthedesert.edu	This course will examine the theoretical and technical dimensions of solar power systems, focusing on solar photovoltaic technologies. Students will learn how solar photovoltaic cells work and how they are made. The basic electrical theory and calculations of electrical capacity/requirements for photovoltaic systems will be reviewed. Topics will include materials and manufacturing, system components, codes, tools and safe work practices. PV system efficiency and pay-back potential will be analyzed to better understand its viability as an alternative energy source. The course will also provide an introduction to solar thermal systems. The course will be conducted initially as part of a larger program funded by the California Energy Commission to prepare workers for utility-scale solar energy employment. However, it is intended	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	to be a comprehensive, stand-alone course as it pertains to residential/commercial applications and NABCEP exam preparation.	
CALIFORNIA – Pasadena **Pasadena City College** Engineering and Technology Division 1570 E Colorado Blvd Pasadena, CA 91106 **Contact/Instructor(s)**: Sam Abedzadeh **Email:** sxabedzadeh@pasadena.edu **Tele.** (626) 585-7274 / (626) 585-7267 **www.pasadena.edu**	**Basic PV Design and Installation Program covers:** **Introduction to Photovoltaic Systems:** Intro to PV terminology, concepts, vocabulary, techniques and safety. Application and benefits of different PV systems. PV system sizing and cost estimating. **Photovoltaic Theory and Installation Techniques:** Solar electricity fundamentals, PV safety, site analysis, PV system sizing and design. Product installation, troubleshooting, net metering laws and NEC requirements for PV systems.	
CALIFORNIA – Pleasant Hill **Diablo Valley College** 321 Golf Club Road Pleasant Hill, CA 94523 **Contact/Instructor(s):** Tom Chatagnier **Email**: tchatagnier@dvc.edu **Tele**. (925) 685-1230, Ext. 2522	**Photovoltaic System Design and Installation (ENSYS 130):** Course includes site evaluations using the solar pathfinder, photovoltaic module characteristics and specifications, inverter characteristics and specifications, design and installation methods, the NEC related to PV systems. The course includes many hands-on activities setting up Sunny Boy and Xantrex inverters and top-of-pole and tracker configurations. Includes off-grid systems.	
CALIFORNIA – Redding **Shasta Builders Exchange** 2985 Innsbruck Drive Redding, CA 96003 **Contact:** Cindy Weaselbear, Education Services Administrator **Email**: cindy@shastabe.com **Tele**. (530) 222-1917	**Solar Photovoltaic Installation** *Including practical hands-on learning* This program covers: PV Markets and Applications, Safety Basics, Electricity Basics, Solar Energy Fundamentals, System Components, PV System Sizing Principles, PV System Electrical Design, PV System Mechanical Design, Performance Analysis, Maintenance and Troubleshooting.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
www.sbetrainingcenter.com		
CALIFORNIA – Rocklin **Sierra College** Dept.: Sciences and Mathematics Division 500 Rocklin Rd. Rocklin, CA 95677 **Contact:** Michael Kane, Interim Dean, Sciences and Mathematics Division **Email**: mkane@sierracollege.edu **Tele**. (916) 660-7900 **www.sierra.cc.ca.us/**	**ESS30 – Beginning Photovoltaic Systems** Introduction to photovoltaic concepts, applications, and the solar energy industry. Includes basics of electricity, load, estimation, energy efficiency, solar sire surveying, photovoltaic system components, sizing, financial analysis, design, installation concepts, and maintenance. **ESS32 – Intermediate Photovoltaic Systems** Expands on the fundamentals of photovoltaics with a focus on system design and installation concepts of grid-connected residential and small commercial systems. Topics include: detailed system sizing, array layout, mounting on various roof constructions, mechanical integration, electrical integration, as well as related electrical codes and workplace safety standards. This course, taken with ESS30 prepares the student to sit for the NABCEP Entry Level Exam.	
CALIFORNIA – Sacramento **American River College** Electronics Technology/Energy 4700 College Oak Drive Sacramento, CA 95814 **Contact/Instructor:** Fred Evangelisti **Email**: evangef@arc.losrios.edu **Tele**. (916) 484-8675 **www.arc.losrios.edu/~electron**	Students will earn a ***Solar Photovoltaic Installation Certificate*** when they complete the five courses outlined below: • **Electronics 302:** Principles of Electricity and Electronics (108 hrs) • **Energy 140/299:** Electrical Applications for Solar Installers (108 hrs) • **Energy 141**: Electrical & Mechanical Applications for Solar Installers (108 hrs) • **Energy 142:** Review and Preparation for the NABCEP Entry Level Exam (32 hrs) • **Energy 143:** Design, Installation and Troubleshooting of Solar PV Systems (108 hrs) The sequence of classes is:	

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	Electronics 302, Energy 140/299, and then Energy 141 and 142 are taken concurrently. The students will be eligible to take the NABCEP Entry Level exam after these four classes are completed. The capstone class for the entire certificate program is Energy 143 which includes advanced system design and troubleshooting.	
CALIFORNIA – San Bruno **Skyline College** 3300 College Drive San Bruno, CA 94066 **Contact:** Mike Williamson **Email:** williamsonm@smccd.edu **Tele**. (650) 738-4221 **www.skylinecollege.edu**	**ELEC 410 Introduction to Solar Installation and Integration:** This is an introductory course targeted to junior-level photovoltaic installers to provide a foundation of skills necessary in solar installation. Topics include electrical theory and practice, PV theory and integration and building trades skills. This course is composed of traditional classroom, electronics and solar labs. The college has a dedicated solar classroom with inverters, panels and roofs to teach installation techniques. Minimum 48 hrs lecture and 16 hrs lab work.	
CALIFORNIA, San Diego **San Diego Electrical Training Center** 4675 Viewbridge Avenue San Diego, CA 92123-1644 **Contact:** Bert Richardson **Email:** brichardson@sdett.org **Tele.** (858) 569-6633 www.positivelyelectric.com	This course is provided as an elective, career-path option to apprentices in their fourth and fifth years. The course consists of fifty-one hours of classroom lecture and fifty-one hours of hands-on lab that includes construction of a rack-mounted array and installation of systems on various commercial and residential projects.	
CALIFORNIA – San Francisco **City College of San Francisco** 1400 Evans Avenue San Francisco, CA 94124 **Contact:** Clifford M. Parsley **Email:** cparsley@ccsf.edu	**Photovoltaic Installation, Entry Level:** This course is an introduction to the planning, installation and maintenance of Solar Photovoltaic Systems. It includes hands-on installation of PV systems and associated safety issues. Traditional classroom instructions, 2 hours	**CNST 104: Solar Thermal installation** **Training for installers of solar water heating systems. Emphasis in on system components, design, installation, troubleshooting and safety. Components of active/passing and direct/indirect systems are taught, as are**

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Tele: (415) 550-4449 www.ccsf.edu	lectures and 3 hours lab per week for 17.5 weeks.	**techniques to optimize installation. Particular focus is on installation and mounting of solar collectors, water heater and storage tanks and piping. System check-out techniques are practiced.**
CALIFORNIA – San Jose **Center for Employment Training (CET)** 701 Vine Street San Jose, CA 95110 **Contact:** Scott Wynn, **Email:** swynn@cet2000.org **Tele:** (408) 639-1174	**ELECTRICIAN** (Residential & General): This is an 810-hour course and will cover (1) Intro to Electrical Industry, (2) Electrical Math, (3) Residential Electricity I, (4) Wiring & Installation Methods, (5) Specialty Systems, (6) Commercial Electricity, (7) Basic Photovoltaics, (8) Customer Service, (9) Computer Skills, and (10) Job Preparedness. **GREEN BUILDING CONSTRUCTION SKILLS**: This is a 900-hour course and will cover (1) Intro to Carpentry, (2) Construction Math, (3) Rough Carpentry, (4) Electrical Skills, (5) Plumbing Skills, (6) Exterior & Interior Finish, (7) Basic Photovoltaics, (8) Customer Service, (9) Computer Skills, and (10) Job Preparedness.	
CALIFORNIA – San Jose **San Jose City College** 2100 Moor Park Ave. San Jose, CA 95128 **Contact/Instructor(s)**: Matthew Welch **Email:** mwelthyone@yahoo.com **Tele.** (408) 206-9704 **www.sjcc.edu**	**Solar 102: Introduction & Photovoltaic Installation:** This course introduces the student to solar photovoltaic (PV) power systems and their installation. Upon successful completion the student will have a rudimentary knowledge for an entry level position in the field. The lab will provide hands-on experience with a variety of systems encountered in the industry. This course was developed at industry request as part of an IDRC grant collaborative. Homework will include conducting research on the Internet for solar equipment specifications. There will also be exercises requiring Internet-based solar industry calculators for determining solar electric system performance and for system design.	

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CALIFORNIA – San Jose **SunPower Corporation** 77 Rio Robles San Jose, CA 95134 **Contact:** trainingsupport@sunpowercorp.com **Tele:** (800) 786-7693 **www.sunpowercorp.com**	**Fundamentals of Residential Design & Installation** Courses only available to SunPower Dealer Partners Residential Associate Fast Track -or- Fundamentals of Residential Design & Fundamentals of Residential Installation & all online prerequisites for those courses. Visit the SunPower University for more information on these courses.	
CALIFORNIA – San Mateo **College of San Mateo** 1700 West Hillsdale Blvd. San Mateo, CA 94402 **Contact/Instructor(s)**: Thomas Diskin **Email: diskin@smccd.edu** **Tele. (**650) 574-6133 **www.collegeofsanmateo.edu**	**Introduction to Alternative Energy Systems for Home and Business Applications:** This course covers the basics of electricity, load analysis, system sizing, and the components involved in off-grid and utility inter-tie PV, wind generation and hydroelectric alternative energy systems. Included will be the wiring of a PV system and demonstration of wind generation and hydroelectric systems. Information will also be provided on the California rebate process and installer certification requirements for home-based alternative energy systems. Students will have the opportunity to design their own site-specific system.	
CALIFORNIA – San Ramon **Laborers Union Training and Retraining Trust Fund for Northern California-San Ramon Training Center** 1001 Westside Drive San Ramon, CA 94583-4098 **Contact**: Jerome Williams, Supervisor of Training **Email:** jwilliams@norcalaborers.org **Tele.** (925) 828-2513 norcalaborers.org/ContactTrainining	**Photovoltaic Systems (PV-2)** **Prerequisites: Intro to PV (PV-1), OSHA 10 and out of class study required.** Photovolataic Systems (PV-2) is a comprehensive 70 hour learner focused hands-on course of instruction and includes: PV safety, PV history, markets & applications, solar energy fundamentals, system components, site evaluation, PV system sizing principles, basic system design, mechanical attachments & integration, electrical integration, performance analysis, maintenance & troubleshooting. Successful completion of this course will qualify participants to take the	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	NABCEP PV Entry Level Exam.	
CALIFORNIA – Santa Monica **Santa Monica College** 1900 Pico Blvd. Santa Monica, CA 90405 **Contact:** Ruth Casillas **Email:** cassillas_ruth@smc.edu **Phone:** (310) 434-4023 **www.smc.edu**	**Introduction to Solar Energy Systems:** Students will gain an understanding of the principles applied to solar photovoltaic and thermal systems. The basic electrical theory and calculations of electrical/capacity requirements for PV systems will be reviewed. Thermal properties, materials, and heat transfer strategies for thermal systems will also be reviewed. Topics will include materials and manufacturing, system components, codes and safe installation procedures. Students will examine the economic, regulatory and infrastructure issues affecting the adoption of solar technologies as well as their potential in solving energy and environmental problems. **Advanced Solar Photovoltaic Systems and Installation.** This competency-based course will prepare students for entry-level employment in the solar photovoltaic (PV) industry and for potential follow-on training in system design. Successful participants will also be qualified to take the NABCEP Entry level exam. Combining theory and hands-on application, this course will include basic electricity, electricity fundamentals in solar PV systems, PV safety, site analysis, PV system sizing and design, components and equipment, product installation, troubleshooting, net metering laws, local codes, and National Electrical Code (NEC) PV requirements.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
CALIFORNIA – Santa Rosa **Santa Rosa Junior College** 1501 Mendocino Ave Santa Rosa, CA 95401 **Contact:** Kimberlee Messina **Email:** Kmessina@santarosa.edu **Tele.** (707) 527-4246 **www.santarosa.edu**	**ELEC156 – Photovoltaic Systems Design and Installation** This course provides technical background and hands on training in grid-tied and battery based photovoltaic system design and installation. It focuses on the technology; how it works and how it is applied in real world energy production applications. After developing a basic understanding of electrical power, photovoltaic technology, and the sun as an energy source, students learn the skills necessary to become involved in residential and small commercial photovoltaic system design and installation. These include; load analysis, system sizing, site review, equipment selection and layout, system installation, and troubleshooting. Through hands-on labs, emphasis is placed on safety and NEC code compliance.	
CALIFORNIA – Sun Valley **East Valley Skill Center** 8603 Arleta Ave Sun Valley, CA 91352 **Contact:** Elizabeth Penuela **Email:** epenuela@lausd.net **Tele. (**818) 759-5843 **www.nvoc.org**	**Photovoltaics 1,2,3** PV1 90 hours Introduction ohms law & PV principles PV2 90 hours hands-on & electrical principles and design. PV3 180 hours continuation of PV2 and prep for NABCEP Entry Exam	
CALIFORNIA – Ukiah **Mendocino College** 1000 Hensley Creek Road Ukiah, CA 95482 **Contact:** Orion Walker **Email:** owalker@mendocino.edu **Tele.** (707) 468-3224 **www.mendocino.edu**	**SST 190 – Introduction to Photovoltaics (Solar)** This course introduces students to the fundamentals of photovoltaic (solar) technology and the process of residential PV system design and installation. This course includes instruction and practice in site evaluation, basic financial analysis, and code compliant PV system design and installation. Students learn the basic concepts and skills needed to work with potential clients and prepare for entry-level employment in the solar PV industry.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
CALIFORNIA – Victorville **Victor Valley College** 18422 Bear Valley Road Victorville, CA 92395-5850 **Contact:** Nord Embroden **Email:** embrodenn@vvc.edu **Tele:** (760) 245-4271 ext. 2246 **www.vvc.edu**	**Photovoltaic System Design and Installation** This program is designed to provide participants with entry level skills necessary for photovoltaic system installers and photovoltaic system designers. The program involves successful completion of five courses prior to receiving a college certificate and sitting for the NABCEP Entry Level exam. **Courses:** CTEV 120 – PV System Design and Installation CT 107 – Technical Mathematics CT 116 – Construction Safety CTMT 122 – Electrical Repair CT 101 – Careers in Construction and Manufacturing	
CALIFORNIA – Visalia **College of the Sequoias** Dept. of Industry and Technology 915 S. Mooney Blvd. Visalia, CA, 93277 **Contact:** Larry Dutto **Email:** larryd@cos.edu **Tele:** (559) 730-3808	**ET 230 – Solar System Design:** This course is based around photovoltaic systems design and installation and goes over photovoltaic concepts, system configurations, National Electrical Code items related to PV systems and installation techniques. Upon completion of the course students will be eligible to take the Entry Level PV exam from the North American Board of Certified Energy Practitioners.	
CALIFORNIA – WOODLAND HILLS **West Valley Occupational Center** 6200 Winnetka Ave. Woodland Hills, CA 91367 Contact: Candace Lee Email: Candace.lee@lausv.net Instructor: Hal Hernandez http://www.lausd.net	**PV Intro and Advanced** PV Introduction – Introduction, safety, basic electricity, PV terminology, basics of PV cells, modules, and arrays, PV system hardware, system sizing basics, rebates and incentives, getting a job in PV. PV Advanced – Introduction, history of PV, safety, wiring, module fundamentals, PV electrical design, and entry level exam review, employability, skills. The advanced course includes approximately 80 hours of hands-on.	

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CANADA – ALBERTA-Vermilion **Lakeland College** 5707 College Drive Vermilion, Alberta, Canada T9X 1K5 **Contact:** Scott Pratt, Electrical Instructor **Tele.** (780) 853-8518 scott.pratt@lakelandcollege.ca **www.lakelandcollege.ca**	**PV Design & Field Practices Course:** This is a five day course that provides people in the electrical field a mixture of "hands-on" training and instruction for PV design and installation practices. This course is an introduction to PV components, system design, electrical codes and standards and industry safety practices. This course will prepare students to write the NABCEP PV Entry Level Exam.	
CANADA – ONTARIO – London **North American Trade Schools** 847 Highbury Avenue, Bldg 4 London, ON N5Y 5B8 519-963-0680 **Contact:** Ryan Alary ralary@natradeschools.ca **www.natradeschools.ca**	**Solar Energy Technology** This curriculum is designed to provide classroom and lab "hands-on" training in the Solar Photovoltaic and Solar Thermal fields. Students in the program will develop a wide range of knowledge and skills that cover everything from system design and installation to maintenance.	
CANADA – ONTARIO - Newcastle **College of Renewable Energy** 3377 Lockhart Road Newcastle, Ontario, L1B1L9 **Contact:** Philip Coulter **Tele.** (905) 987-5475 Email: pecoulter@live.com www.collegeofrenewableenergy.com	**PV Design & Installation Course** A Combination of knowledge and skills are required to design and install PV systems. This 5-Day hands-on PV design & installation course is based on NABCEP learning objectives and prepares participants to challenge the entry level exam. This Course covers system components, site analysis, PV modules, mounting systems, and safety as well as details on the fundamental requirements for implementation of safe, efficient, and code-compliant PV systems. Participants will also learn the basics of sizing an off-grid stand-alone and grid-tied systems, wire sizing, over current protection, and grounding. Maintenance and service procedures round out this course content.	

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CANADA –BC - Victoria **Camosun College** 4461 Interurban Road Victoria, BC, Canada V9E 2C1 **Contact:** Ybo Plante **Email:** yplante@camosun.bc.ca **Tele.** (250) 370-4221 **www.camosun.ca/ce**		**Solar Thermal Entry Level** **This course covers the basic skills and fundamentals of solar thermal technology. Students will learn how to: identify soar thermal components; conduct steps in solar site analysis; ensure safe practices and risk management; identify systems for specific climates; and determine methods to install and maintain systems. Through a series of lectures and hands-on solar labs, students will have acquired the foundation needed for entry-level in the field of solar thermal and domestic hot water heating. This course will be of interest to installers, pipefitters, engineers, inspectors, as well as do-it-yourselfers considering their own installation. This course is based on the NABCEP Entry Level Learning Objectives and Job Task Analysis for Installers. Participants are encouraged to also take "Fall Protection" training (course TTCE 211V) Prior trades experience is recommended.**
CANADA, PEI - Charlottetown **Holland College** 140 Weymouth St. Charlottetown, PE C1A 4Z1 **Contact:** Kelly Sampson **Email:** kksampson@hollandcollege **Tele.** (902) 393-1009 www.Hollandcollege.com	Course Description Pending	**Course Description Pending**
CANADA – PRINCE EDWARD ISLAND – Charlottetown **Holland College** Prince of Wales Campus – Centre for Applied Science and Technology 140 Weymouth St Charlottetown, PE, Canada C1A 4Z1	**Energy Systems Engineering Technology** During the two years of this program, students will learn about energy in terms of renewable and energy efficiency. They will learn the theory and well as getting hands-on experiences.	

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Contact: Blair Arsenault **Tele.** (902) 566-9330 Email: bparsenault@hollandcollege **www.hollandcollege.com**		
COLORADO - Aurora **Ecotech Institute** 1400 South Abilene Street Aurora, CO 80012 **Contact:** Chris Gorrie **Email**: chris.gorrie@ecotechinstitute.com **Tele.** (720) 213-2641 **ecotechinstitute.com/solar-energy**	**Solar Energy Technology:** This program is designed to prepare students for careers in the field of renewable energy and focuses on solar energy technologies. Well-equipped campus laboratories and facilities give students the opportunity to apply theory in simulated training environments. Upon completion of the program, graduates should be able to: Demonstrate an understanding of PV Modules and PV System Mechanical and Electrical Design Demonstrate an understanding of industry standards Operate, troubleshoot, maintain and repair photovoltaic systems Apply safety principles Coordinate a job search	
COLORADO - Denver **Rocky Mountain Chapter IEC** 480 E. 76th Ave., Bldg. 5, Unit A/B Denver, CO 80229 **Contact:** Paul Schmid, Training Director **Email**: paul@iecrm.org **Tele.** (303) 853-4886 **www.iecrm.org**	**NABCEP Entry Level** This innovative course will provide students with a thorough overview of Solar Photovoltaic (PV) technology. Specific subjects that will be covered within the coursework include: PV cells, modules, and system components; electrical circuits; PV system design, estimation, and NEC requirements; solar electric products and applications; an understanding of PV equipment and theory. The course will cover all NABCEP Photovoltaic Entry Level PV Systems Learning Objectives and task analysis. Included within the course will be electrical best practices and recommended safety procedures, system design, NEC, and industry standard practices. The course will also provide hands-on training and will cover safety/fall protection, electrical design, structural mounting systems, mechanical/wind load	

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	considerations. The NABCEP Job Task Analysis will be the central focus of all hands-on components of the course.	
COLORADO - Greeley **Aims Community College** 5401 W. 20th St. Greeley, CO 80634 **Contact:** John Mangin **Email**: john-mangin@aims.edu **Tele.** (970) 339-6413 **www.aims.edu**	**ENY 131 Advanced Solar PV** This course teaches advanced principles of a residential photovoltaic system. Additional information will be provided on site evaluation, system design, panel installation, wiring, grounding, bonding and commissioning. Off grid living and systems with battery back-up will also be studied.	
COLORADO - Lakewood **Red Rocks Community College** 13300 W. 6th Ave, Lakewood Colorado 80228 **Contact:** Larry Snyder, Coordinator, Renewable Energy Technology; Construction Technology. **Email**: Larry.Snyder@rrcc.edu **Tele. (**303) 914-6306 **www.rrcc.edu** The minimum classes an average student would need to take to sit for the NABCEP PV exam would be: • OSH 127 OSHA 10 hour construction card certification • HVA 105 Basic electricity • ENY 130 & 131 Solar PV classes • ENY 134 NABCEP prep class Red Rocks offers a Program in Renewable Energy Technology consisting of the following: (for further info, go to www.rrcc.edu)	ENY 101 Introduction to Energy Technologies 3 credits ENY 102 Building Energy Audit 3 credits ENY 120 Solar Thermal System Install 4 Cts ENY 130 Solar Photovoltaic's Grid-tie 2 Cts ENY 131 Advanced Solar Photovoltaics 2 Cts ENY 134 NABCEP Entry Level Prep 1 Ct HVA 105 Basic Electricity 4 Credits OSH 127 10-HR Construction Industry Standards 1 Credit EIC 110 Electrical Installations I 4 credits EIC 120 Electrical Installations II 4 credits EIC 130 National Electrical Code I 4 Cts EIC 135 National Electrical Code II 4 Cts HVA 132 AC&R Controls 4 Cts HVA 162 Heating Controls 4 Cts PLU 101 Piping Skills 4 Cts CON 105 Construction Technology 4 Cts HVA 141 Sheet Metal Fabrication 2 Cts	

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COLORADO-Paonia & Carbondale **Solar Energy International** 39845 Matthews Lane Paonia, CO 81428 **Contact:** Breccia Wilson **Email:** breccia@solarenergy.org **Tele.** 970-704-5778 www.solarenergy.org/ **ONLINE Option** **Solar Energy International offers the following training. Our online courses are 6 weeks in length and our in-person workshops, which are 5-6 days in length, are offered all across the country. Check our website for more details. SEI highly recommends that students take PV101 and PV203 before sitting for the Entry Level Exam. SEI students can take the exam at our Paonia, CO facility or through computer-based testing.** **We also offer five-day intensive lab weeks.** **Our PV201L Solar Electric Lab Week (Grid-Direct) is designed to follow PV101 or PV203.** **Our PV201L Solar Electric Lab Week (Battery Based) is designed to follow PV203.**	**PV 101 Solar Electric Design and Installation (Grid-Direct):** This course will provide an overview of the three basic PV system applications, primarily focusing on grid-direct systems. The goal of the course is to create a fundamental understanding of the core concepts necessary to work with all PV systems, including: system components, site analysis, PV module criteria, mounting solutions, safety and commissioning. The course will also cover the basics of sizing a residential grid-direct system, wire sizing, overcurrent protection, and grounding --all of which will be expanded upon in PV202. **PV202 Grid Direct Design and the NEC**: This workshop will build upon the core concepts from PV101 and continue to emphasize grid-direct systems. The course will focus significantly on the National Electrical Code (NEC) , including grid interface calculations, grounding considerations, and advanced component specification. Students will learn to evaluate system performance under various operating conditions. Commercial system design elements, such as inter-row shading, inverter selection, and data monitoring solutions will also be covered. This course combines class lectures with individual problem solving exercises covering common design considerations. **PV203 Battery-Based Design:** This course will build upon the core concepts from PV101, with a specific emphasis on battery-based system design. Students will work through step-by-step; design process for battery-based applications, including stand-alone (off-grid), grid-tied with battery back-up, and hybrid systems. Topics such as load	**ST101: Solar Training - Solar Hot Water Design and Installation** **Participants in this workshop will learn the theory, design considerations and installation strategies necessary to install and maintain a solar domestic hot water system. Passive solar water heaters, drainback systems, antifreeze systems, and photovoltaic powered systems are discussed in depth, as well as an introduction to pool and space heating systems. The workshop will include some hands-on labs and tours of solar hot water systems.**

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	analysis, component selection, battery safety, voltage drop, and commissioning procedures will be presented. In addition to sizing exercises and calculations, students will explore additional design and considerations unique to battery-based systems.	
COLORADO - Rifle **Colorado Mountain College** Integrated Energies Department 3695 Airport Road Rifle, CO 81650 **Contact:** Chris Ellis **Email:** cellis@coloradomtn.edu **Tele.** (970) 625-6935 **coloradomtn.edu**	**Basic Solar Photovoltaic Certificate** EIC 130 National Electric Code I 4 cr ENY 130 Solar Photovoltaic Grid-tie 2 cr OSH 117 10-hour OSHA Voluntary Compliance 1 cr or PRO 110 Safety, Health, and Environment 3 cr	
CONNECTICUT - North Haven **Gateway Community College** 88 Bassett Road North Haven, CT 06473 **PV Contact:** Dr. David N. Cooper, Dean, Corporate and Continuing Education Department. **Email:** dcooper@gwcc.commnet.edu **Tele.** (203) 285-2426 **SH Contact: Theresa Kasun** **Email: tkasun@gwcc.commnet.edu** **Tele. (203) 285-2448** **www.gwcc.commnet.edu**	**Solar Photo Voltaic Installer** **Training:** Classroom and laboratory components include demonstration of electrical concepts, electrical experiments, and skill practice exercises installing PV components. Students will learn solar energy concepts, basic processes and mechanical operations of PV devices, system sizing, building codes and underwriting issues, load determination and system performance, mounting structure considerations, interconnection requirements, PV energy storage, and net metering. Students who complete the program will learn the fundamentals of how to properly site a system, how to design the right system, and how to cost grid tied and battery storage systems. Students will obtain a practical understanding of long-term system costs and will obtain current information on state and federal rebates and tax incentive programs.	

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CONNECTICUT - Rocky Hill **IEC of New England, Inc.** 1800 Salas Deane Highway Rear Building Rocky Hill, CT 06067 **Contact:** Earl Goodell **Email:** earl@iecne.org **Tele.** (860) 563-4953 **www.iecne.org**	In this course students will walk through the entire process associated with sales, siting, design and installation of photovoltaic (PV) systems. This will proceed from initial customer interest through to a successfully installed system that will pass electrical and mechanical inspection. Students will learn about the history and applications of solar electricity. They will discover how photovoltaic cells convert sunlight into electricity and learn how to evaluate different products that are on the market. Students will study the technical specifications for the components of a solar electric system and learn how to properly specify components that work together to produce electricity to meet both on and off-grid electric loads. Procedures for the safe, code-compliant installation and maintenance of photovoltaic systems will be explored. At the end of the course students will have the opportunity to sit for the NABCEP PV Entry Level Exam.	
CONNECTICUT - Wallingford **NECA & IBEW Local 90 JATC** 2 North Plains Industrial Road Wallingford, CT 06492 **Contact:** Paul Costello **Email:** pcostello@jatc90.org **Tele.** (203) 265-3820 **www.jatc90.org**	**Solar Photovoltaic Design, Installation and Maintenance** This course will introduce students to photovoltaic design, installation, and maintenance of PV systems. The course will follow the NJATC Photovoltaic text. The classroom theory and hands-on training will cover the following learning objectives: PV Markets & Applications, OSHA Construction Safety, NFPA 70E Electrical Safety, Electrical Basics, Solar Energy Fundamentals, PV Module Fundamentals, System Components, Sizing, PV System Electrical & Mechanical Design, and Performance Analysis, Maintenance and Troubleshooting. In addition to the applicable NEC requirements.	

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CONNECTICUT - Waterbury **Industrial Management and Training Institute** 233 Mill Street Waterbury, CT 06706 **Contact:** Marcel Veronneau, CEO **Email:** mveronneau@imtiusa.com **Tele.** (203) 753-7910 **www.imti.edu**	**Introduction to Solar Photovoltaics** Created for individuals wanting to attain a basic knowledge and application of solar photovoltaic system operations. Based on the ten objectives contained in the NABCEP Entry Level Program, this 45 hour course will cover: • PV Markets and Applications • Safety Basics • Electricity Basics • Solar Energy Fundamentals • PV Module Fundamentals • System Components • PV System Sizing Principles • PV System Electrical Design • PV System Mechanical Design • Performance Analysis, Maintenance and Troubleshooting.	
FLORIDA - Cocoa **University of Central Florida** Florida Solar Energy Center 1679 Clearlake Road Cocoa, FL 32922 **Contact:** JoAnn Stirling **Email:** joann@fsec.ucf.edu **Tele.** (321) 638-1420 **To register go to: www.fsec.ucf.edu and search "PV course"**	**Installing PV Systems:** This week-long course covers the design and installation of photovoltaic (PV) systems and involves actual hands-on work with PV systems and equipment. This program is intended for contractors, utility service personnel, engineers and other practitioners with an overall goal of developing "system-knowledgeable" professionals to help ensure the safety and quality of PV system installations. The course is offered the first full week of each month. FSEC has offered PV training courses of this nature for over 25 years.	
FLORIDA - Fort Lauderdale **US Solar Institute** 913 NE 4th Avenue Ft. Lauderdale, FL 33304 **Contact:** Ray Johnson, President **Email:** info@ussolarinstitute.com **Tele.** (954) 236-4577	**PV 201 – Introduction to PV System Design & Installation** US Solar Institute offers a diploma program in photovoltaics that is licensed by the Department of Education and our continuing education courses are approved by the Florida Department of Business and Professional Regulation. We offer introductory to advanced solar	

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www.ussolarinstitute.com	training courses delivering an educational experience that provides real world knowledge, a solid understanding of solar energy installation and sales, solar contracting and engineering per the National Electric Code, and hands-on field training. USSI trains everyone from solar novices to licensed electricians for a true career in the solar industry.	
FLORIDA - Gainesville **Gainesville Electrical JATC** 113 NW 3rd Avenue, #211 Gainesville, FL 32601 **Contact/Instructor:** John Gurski **Email:** John@SullivanSolarPower.com **Tele.** (352) 258-5957 **www.Gainesvillejatc.org**	**Photovoltaic Installation and Design**: this course introduces students to photovoltaic design, both mechanical and electrical. The course follows the PV systems textbook developed by ATP and the NJATC. Each class will also have a hands-on installation project through the IBEW. The course will consist of a total of 48 hours of traditional teaching and 48 hours of hands-on installation training. The course is four-months in duration and is offered twice a year starting in spring/fall.	
FLORIDA - Gainesville **Gainesville Job Corps Center** 5301 NE 40th Terrace Gainesville, FL 32609 **Contact/Instructor:** Erick Green **Email:** green.erick@jobcorps.org **Tele.** (352) 377-2555 ext. 364	**Installing and Maintaining Photovoltaic Systems** A comprehensive course built around the in-depth understanding of PV systems. It will include Electrical Theory, Installation Techniques and monitoring of PV systems. The course will cover grid-tied, stand-alone and battery backup systems. Set up and operation of said systems will be required in the course.	**Solar Photovoltaic & Thermal Installation** **In Depth training in the installation of Solar Thermal. We train students in all aspects of Solar Thermal to include but not limited to flat-plate collectors, thermosyphon systems, roof mounting, track mounting, and theories behind thermal fluid movement, Solar pool heating and the installation of hot water holding tanks.**
FLORIDA - Green Cove Springs **Alternate Energy Technologies** 1345 Energy Cove Court Green Cove Springs, FL 32043		**AET University's Solar Heating and Cooling 101** **Prereq: Solar Water Heating 100: The Fundamentals**

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Contact: Andrew East **Email:** andrew@aetsolar.com **Tele. (**904) 781-8305 www.aetsolar.com/training.php		**This 6 day course covers all of the information necessary to empower our students to build a sustainable business in sustainable energy. The course features a two day hands-on installation training course, the goal of which is to ensure that our graduates can complete any residential install in one day. Additionally our business development section provides experiential data from industry experts on how to build a successful business model, as well as sales and marketing best practices. Drawing upon over 37 years of industry experience AET University provides an unparalleled learning experience in a unique environment.**
FLORIDA - Jacksonville **Jacksonville Electrical JATC** 4951 Richard street, Jacksonville, FL 32207 **Contact:** James Nolan **Email:** jnolan@jaxaet.org **Tele.** (904) 737-7533 **www.jaxaet.org**	This Jacksonville Electrical JATC course provides an overview of photovoltaic systems and is open to NECA/IBEW contractors, journeymen, instructors and apprentices. Topics include an Introduction of PV Systems and Applications, Solar Radiation, Site Surveys and Preplanning, System Components and Configurations. The course will cover Cells, Modules and Arrays, Along with Battery Principals, Types and Systems. Additional topics will include Charge Controllers, Inverters, System Sizing, Mechanical Integration, Electrical Integration, Utility Interconnection, Permitting and Inspection, Commissioning, Maintenance and Troubleshooting. The final topic is the Economic Analysis covering Incentives and Cost Analysis for an installed Photovoltaic System.	
FLORIDA - Miami **College of Business & Technology** 8991 SW 107th Avenue Suite 200 Miami, FL 33176	**Installing Photovoltaic Systems** This course provides the basic knowledge in relationship with installing, designing and troubleshooting of a photovoltaic system. The students will also gain	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Contact: Miguel A. Padilla Caneiro **Email:** miguel@cbt.edu **Tele.** (305) 273-4499	knowledge pertaining PV articles in the NEC. This course provides the basic knowledge in relationship with installing, designing and troubleshooting of a photovoltaic system. The covered topics include solar radiation, site survey, array orientation, components, systems configurations, system sizing and design, mechanical and electrical installation, utility interconnection, codes regulations, safety practices, maintenance and feasibility analysis.	
FLORIDA, - Largo **Solar Source Institute** 10840 Endeavour Way Largo, FL 33777 **Contact:** Rick Gilbert, President **Email:** rick@solarsource.net **Tele.** (800) 329-1301 **www.solarsource.net**	With over 25 years of experience, Solar Source developed a training arm to help meet the needs of the growing solar industry. As a result, **Solar Source Institute** (SSI) was established. Since its inception, SSI has trained approximately 500 electricians, plumbers, roofers, architects, building inspectors, technical trainers, and other construction-related workers. SSI training teaches not only fundamentals and installation, but also covers permitting, sales & marketing, financial incentives, and more to assure the students can manage jobs from start to finish. SSI is licensed by the Dept. of Education and is a member of the Florida Association of Post-Secondary Schools and Colleges. SSI courses are approved for continuing education credits by the Florida Department of Business and Professional Regulation for both the Construction Industry Licensing Board (CILB) and the Electrical Contractors Licensing Board (ECLB). SSI is partnered with several State colleges in Florida and beyond to offer consistent quality training opportunities in multiple locations.	
FLORIDA, - Melbourne	**Introduction to Photovoltaics** This course introduces students to the theory of operation of	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Eastern Florida State College 3865 North Wickham Road Melbourne, FL 32935 **Contact:** Lisa Austin **Email:** austinl@easternflorida.edu **Tele.** 321-433-7081 www.easternflorida.edu	photovoltaic systems including their application to homes and small commercial buildings, site selection/survey, system components, reliability and maintainability requirements of systems. **Advanced Photovoltaics** This course is a continuation of Introduction to Photovoltaics and covers designing and building residential systems including system sizing, mechanical installation, and electrical hookup of grid tied/utility interactive and stand alone systems. **Photovoltaic Technology** A study of photovoltaic (PV) electricity systems including theory of operation, site selection/survey, systems components, system sizing, mechanical installation, and electrical hookup of grid tied/utility and standalone systems.	
FLORIDA - Tampa **D.G. Erwin Technical Center** 2010 E. Hillsborough Avenue Tampa, FL 33610 **Contact:** Donna Matassini **Email:** donna.matissini@sdhc.k12.fl.us **Phone:** (813) 231-1829 **erwin.edu**	**Solar Photovoltaic System Design, Installation and Maintenance** This program provides students with the technical knowledge and skills needed to adapt a solar photovoltaic design; conduct a site assessment; read blueprints; and install, maintain, and troubleshoot a solar photovoltaic system. Students will learn basic electricity concepts in DC and AC electrical circuits, voltage, and electric codes, as well as practice hands-on basic residential wiring. Solar installation site assessments and design skills will be developed through hand sketches, use of IT Technology and Computer Aided Drafting (CAD) software.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
FLORIDA - Tallahassee **Tallahassee Community College** 444 Appleyard Drive Tallahassee, FL 32304 **Contact:** Alex Dalmau **Email:** dalmaua@tcc.fl.edu **Tele.** (850) 201-8653 workforce.tcc.fl.edu/training/florid	**Introduction to Photovoltaics** This course covers the design and installation of PV systems. This program primarily targets contractors, electricians, utilities, engineers, and other practitioners, with an overall goal of developing —system knowledgeable professionals to help ensure the safety and quality of PV system design and installations. An emphasis is placed on code compliance and accepted state-of-the-art industry design and installation. This course includes a hands-on section where participants will build a functioning solar PV system, from design to mounting on a roof, to generating electricity for charging batteries or tying into the local electrical grid. Text: *Photovoltaic Systems, 2nd Edition* by James Dunlop.	
GEORGIA - Americus **South Georgia Technical College** 900 South Georgia Tech Parkway Americus, GA 31709 **Contact:** Lee Radney **Email:** lee.radney@magesolar.com **Tele.** (478) 609-6750 www.southgatech.edu	**Solar PV 101: Entry Level** PV and Equipment Safety (1,2); Basic of Electricity (3); Efficiency Auditing and Implementation (4); PV System types and Component Introduction (1,6); PV Modules and Specifications (5); Instrumentation used in PV (DMM, Clamp-on Meters, Pyranometers, etc.) (10); PV System Design (7); Site Analysis, PV System Electrical (overview) Specifying an Inverter, PV Mounting (9), PV System Sizing; Grounding (8); PV Electrical (in-depth) (8) System Wiring, Over-current devices; Commissioning and Safety (2,8,9); Performance, Analysis and Troubleshooting (10). Number of Hours: 40	
GEORGIA - Dahlonega **Solairgen** 119 Highway 52 West Dahlonega, GA 30533	**PV-203** is an IREC Accredited Photovoltaic installation training class following the scope of the NABCEP Task Analysis. This class, combined with Cost Analysis for Marketing and Finance and Battery	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Contact: Kelly Provence, President/Trainer **Email:** koprovence@solairgen.com **Tele.** (706) 867-0678 **www.solairgen.com** **ONLINE Option**	Systems, provides comprehensive Entry Level PV knowledge to students, preparing them to meet or exceed the required Learning Objectives of the PV Entry Level Exam. All three classes encompass content from the NABCEP Task Analysis, and guide each student through the classroom and intensive hands-on PV system installation experience in the Solairgen facility.	
GEORGIA - Savannah **Savannah Technical College** **Electrical Construction & Maintenance** 5717 White Bluff Road Savannah, GA 31405 **Contact:** Lester E. Wiggins **Email:** lwiggins@savannahtech.edu **Tele.** (912) 443-5861	**Photovoltaic System Installation:** This course introduces techniques and methods on how to install residential and commercial solar photovoltaic systems. Solar systems include grid-connected, stand alone and hybrid.	
HAWAII - Honolulu **Honolulu Community College** 874 Dillingham Boulevard Honolulu, HI 96817 **Contact/Instructor(s)**: Ismelda Agbisit **Email:** iagbisit@hawaii.edu **Tele.** (808) 847-9823 **www.pcatt.net**	**Introduction to Solar Photovoltaic Design** This course is for anyone who is interested in learning how to produce electricity from the sun. It will be useful for people seeking employment in the solar energy industry as well as for those seeking to generate solar electricity for their own home or organization. It is also for anyone who recognizes the need to support an environment that is sustainable and economically viable using methods that won't pollute or exhaust the resources of our planet. PV systems utilize a variety of equipment, some of which is manufactured through sophisticated and complex technologies. We will learn about the main components of a PV system and the basics of the principles by which they are able to transform energy from sunlight to electricity. This will include systems that are tied to the utility grid as well as systems that stand alone or include storage backup with	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	batteries. Once the right type of equipment is selected we need to know how much is required, where to put it, and how to connect it. This is the key to intelligent PV design. Understanding these principles will be a main focus for the class.	
HAWAII - Kaneohe **Hawaii Pacific University** 45-045 Kamehameha Highway Kaneohe, HI 96744-5297 **Contact/Instructor(s)**: Dr. Stephen Allen **Email:** sallen@hpu.edu **Tele.** (808) 236-3500	**Photovoltaic Systems Design** • **(ENVS 3803):** This course provides an intro to photovoltaic systemsdesign. Students learn the fundamental principles of solar energy, PV modules and how to design a safe, code-compliant PV system. Preparing a PV system design is a key component of the course. Case studies will also be examined. The course provides the skills suitable for a supervised, entry level position in the photovoltaic industry.	
HAWAII - Kaneohe **Windward Community College** 45-720 Keaahala Road Kaneohe, HI 96744 **Contact: Preshess Willets-Vaquilar** **Email:** preshess@hawaii.edu **Tele.** (808) 235-7365 windwardcce.org/	**Introduction to Photovoltaic Design and Installation** This course is your first step toward building a career as a nationally recognized certified Solar PV Installer or certified PV Technical Salesperson. Basics of electricity, principles of solar irradiance and irradiation, and PV System components/configurations will be covered. Completing this course is required to be eligible to take the NABCEP PV Entry Level exam. A person who passes the exam has demonstrated a basic knowledge of photovoltaic systems, which is an important first step in preparing individuals to become highly skilled, qualified and experienced tradespersons and professionals in the PV industry. ****According to Hawaii law, all electrical work needs to be performed by a licensed electrician.	
HAWAII - Kauai **Kauai Community College** 3-1901 Kaumualii Highway Lihue, HI 96766	**Introduction to Solar Photovoltaic Design** This course is for anyone who is interested in learning how to produce electricity from the sun. It will be	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Contact/Instructor: Robert Conti **Email:** rconti@hawaii.edu **Tele.** (808) 245-8327 **kauai.hawaii.edu**	useful for people seeking employment in the solar energy industry as well as for those seeking to generate solar electricity for their own home or organization. It is also for anyone who recognizes the need to support an environment that is sustainable and economically viable using methods that won't pollute or exhaust the resources of our planet. PV systems utilize a variety of equipment, some of which is manufactured through sophisticated and complex technologies. We will learn about the main components of a PV system and the basics of the principles by which they are able to transform energy from sunlight to electricity. This includes systems that are tied to the utility grid as well as systems that stand alone or include storage backup with batteries. Once the right type of equipment is selected we need to know how much is required, where to put it, and how to connect it. This is the key to intelligent PV design. Understanding these principles will be a main focus for the class.	
IOWA – Waterloo **Hawkeye Community College** 1501 East Orange Road Waterloo, IA 50701 **Michael Barnes (717) 554-5801** michael.barnes@hawkeyecollege.edu **www.hawkeyecollege.edu**	**Solar Photovoltaic Design and Installation** This comprehensive program will train students to design and install residential and commercial PV systems utilizing NABCEP Entry Level Learning Objectives.	
ILLINOIS, Alsip **IBEW – NECA Technical Institute** 6201 West 115th Street Alsip, IL 60803 **Contact/Instructor(s)**: Harry Ohde **Email:** hohde@in-techonline.org **Tele.** (708) 389-1340	**Theory and Installation Techniques of Photovoltaic Systems:** Classroom and hands-on exercises involving the complete step-by-step process of installing and commissioning various PV systems and related equipment. An emphasis is placed on code compliance and load calculations.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
ILLINOIS, Carterville **John A. Logan College-** **Dept. of Continuing Education** 700 Logan College Road Carterville, IL 62918 **Contact:** Barry Hancock **Email:** barryhancock@jalc.edu **Tele.** (618) 985-2828 ext. 8202 **Or** **Contact:** Aur Beck tech@aessolar.com **www.jalc.edu**	John A. Logan College offers two solar design and installation courses. The Beginning course is an **introduction to photovoltaic systems**, design, and procedures commonly practiced in the photovoltaic industry and trade. The course is primarily intended for those with a construction and construction management background who seek to become skilled photovoltaic installers, electricians, or designers. The **Advanced Solar Design and Installation** course provides detailed instruction in the design and installation of photovoltaic systems with practical, hands-on practice. Those who successfully complete the advanced course will have the knowledge and skill sets required for entry level positions within the renewable energy industry and will be able to converse with solar energy professionals. The final examination for the advanced course is the examination for the **NABCEP PV Entry Level Exam.**	
ILLINOIS, Godfrey **Lewis & Clark Community College** 5800 Godfrey Road (TR145) Godfrey, IL 62035 **Contact:** Michael Morgan **Email:** mmorgan@lc.edu **Tele.** (618) 468-4922 **www.lc.edu**	**Photovoltaics (PV)** This course provides an introduction to the basic principles of PV design, installation guidelines, and safety issues involved with PV power systems.	
ILLINOIS, Kankakee **Kankakee Community College-** **Technology Division, Electrical Technology Program** 100 College Drive Kankakee, IL 60901 **Contact/Instructor:** Timothy Wilhelm **Email:** twilhelm@kcc.edu	Kankakee Community College (KCC) offers a Renewable Energy Technology (RET) study-track within its Electrical Technology Program. This RET study-track includes four RET courses, approved by the Illinois Board of Higher Education: ELTR1223, Survey of Renewable Energy Technology; ELTR2314, Solar-Thermal Technology; ELTR2324, Small-Wind Energy Technology; and,	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Tele. (815) 802-8864 **www.kcc.edu**	ELTR 2334, Solar-Photovoltaic Technology. KCC is an approved Service Provider of the NABCEP PV Entry Level Exam, and students who complete ELTR2334 will be able to take PVEL Exam here at the KCC Testing Center. KCC Solar-PV course meets for 5 hours per week, for 16 weeks and involves traditional classroom lecture sessions, and hands-on experience with real-world PV-system hardware. ELTR2334 was developed by, and is taught by, Tim Wilhelm. Tim has been a RET professional for over 30 years. He is SunWize Technologies' first dealer, he's an early NABCEP Certificant, and he's a Registered Professional Engineer.	
ILLINOIS, Normal **Heartland Community College Continuing Education and Technology** 1500 W. Raab Road Normal, IL 61761 **Contact:** Julie Elzanati, Director of ICCSN Sustainability Centers **Email:** julie.elzanati@heartland.edu **Tele.** (309) 268-8166 **www.heartland.edu**	**Solar Design & Installation – Level II** Continue your photovoltaic (PV) systems training with instruction in advanced design and detailed installation procedures. Students will receive hands-on experience. Those who successfully complete this course will have the knowledge and skill set required for entry level positions within the renewable energy industry. On the last day, students will take the official North American Board of Certified Energy Professionals (NABCEP) Entry Level Exam. Successful completion of this course enables you to register for the Advanced Solar Design and Installation course be offered in a future term. Experience or education in construction and construction management is desirable, but not required. *Prerequisite: Solar Design & Installation – Level I.* **REEC 140: Renewable Energy Concepts**	

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	Renewable Energy Concepts explores the technologies used in renewable energy Systems. The course covers making, distributing and installing RE systems. Specific systems include photovoltaic, wind, geothermal, solar heating and biomass. Lab activities include proper setup and installing RE systems, measuring energy usage and controlling RE systems.	
INDIANA – Fort Wayne **Fort Wayne Electrical JATC** 138 Chambeau Road Fort Wayne, IN 46805 **Contact/Instructor(s)**: Gregory L. Fuller **Email:** s.emmons1@verizon.net **Tele.** (260) 483-6257	**Photovoltaic Systems Class:** The course consists of a minimum of 40 hours classroom training using the textbook and resource guide presentation developed by ATP and the NJATC. It is followed by the installation of a 30 panel system. Our training center is both a JATC and a DOL approved apprenticeship.	
INDIANA – Nashville **Brown County Career Resource Center** PO Box 2087 Nashville, IN 47448 **Contact/Instructor(s)**: David Bartlett **Email:** dbartlett@brownco.k12.in.us **Tele.** (812) 988-5880 **www.bccrc.net**	**Solar Energy Systems & Photovoltaic Technology** Traditional classroom to meet the 10 NABCEP Learning Objectives with NJATC "Photovoltaic Systems" as primary reference. The class will meet 20 times for 2 hour sessions. The highlights will include hands on components with solar pathfinder and basic wiring exercises.	
KANSAS - Chanute **Neosho County Community College** 800 W. 14th Street Chanute, KS 66720 **Contact:** Brenda Krumm **Tele.** (620) 431-2820 ext. 234 **Email: bkrumm@neosho.edu**	**The Solar Pathway** The Solar Pathway teaches competencies developed by NABCEP. These skills prepare students to sit for NABCEP PV Entry Level and the NABCEP Solar Heating Entry Level Exams. SUST 104 – PV Systems SUST 106 – PV Systems Installation SUST 108 – PV Systems Troubleshooting SUST 204- Solar Hot Water &	**The Solar Pathway** **The Solar Pathway teaches competencies developed by NABCEP. These skills prepare students to sit for the NABCEP Solar Heating Entry Level Exams.** **SUST 104 – PV Systems** **SUST 106 – PV Systems Installation** **SUST 108 – PV Systems Troubleshooting** **SUST 204- Solar Hot Water &**

FACILITY/INSTITUTION	PV COURSES	SH COURSES
www.neosho.edu	Heating Systems SUST 206 – SHW & Heating Installation **SUST 208 – SHW & Heating Troubleshooting**	**Heating Systems** **SUST 206 – SHW & Heating Installation** **SUST 208 – SHW & Heating Troubleshooting**
KENTUCKY - Florence **Gateway Community and Technical College** 500 Technology Way Florence, KY 41042 **Contact**: Thomas Collins, Prof. of Electrical Technology **Tele. (859) 442-4106** **Email:** tom.collins@kctcs.edu www.gateway.kctcs.edu	**Solar/Photovoltaic Technologies EGY 230** This 60-hour course (4 semester hours) is part of a Solar/PV technologies certificate and an associate degree in Energy Technologies. The course is 50% le3cture and 50% lab, covering the ten major categories of the NABCEP Entry Level Program. Objectives of the course include developing the participant's ability to 1) determine the available solar resource and conduct site assessments for PV installations, 2) characterize the operating characteristics and performance of PV systems, 3) determine appropriate code-compliant configuration 4) plan and prepare for installations, including customer relations, developing performance expectations, responsibilities and schedule, 5) implement and modify mechanical design that meet performance, architectural and structural requirements, 6) implement and modify electrical designs for PV systems that meet the safety, code-compliance, and functional requirements, 7) conduct acceptance tests and inspections, and commission PV system installations, and 8) evaluate, troubleshoot and maintain PV systems.	
KENTUCKY - Madisonville **Madisonville Community College** 2000 College Drive Madisonville, KY 42431 **Contact:** Jake Hildebrant **Tele.** 270-883-1160 **Email:** jake.hildebrant@kctcs.edu	**The ENM 121 course qualifies students to take the** NABCEP PV Entry Level Exam while earning college credits. All students of the Energy Management program receive very low cost, in-state tuition. This 8 week course does not require a textbook. This is one of the 5 courses in the Energy Management program at Madisonville Community College that has an embedded, national certificate. All of the	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	courses do not require textbooks, but students need an iPad.	
LOUISIANA - Baton Rouge **Baton Rouge Community College** 201 Community College Drive Baton Rouge, LA 70806 **Contact**: Will Seaman **Tele.** (225) 216-8436 **Email:** seamanw@mybrcc.edu justin@gulfsouthsolar.com	**Solar Panel Design and Installation Course:** Students taking this course will learn up-to-date information in regards to solar panel design and installation; and potential tax rebates offered at the state and federal level. The course is taught by industry professionals that bring actual field and business knowledge to the learning experience. The course utilizes the Solar Energy International text, *Photovoltaics: Design and Installation Manual*; information from the Florida Solar Energy Center; and follows the learning objectives for the NABCEP Entry Level Certificate Program. Class time is 45 hours which is broken up into two settings: classroom and hands-on lab. During lab time, students will do actual installation of various solar panel systems in a state of the art training facility. Students who successfully complete all course hours will be offered the NABCEP Entry Level Exam as a part of the course. Textbooks are included.	
MAINE, Bangor **Eastern Maine Community College** 354 Hogan Road Bangor, ME 04401 **Contact/Instructor:** Richard Reardon **Email:** rreardon@emcc.edu **Tele.** (207) 974-4634 **www.emcc.edu**	**Solar Photovoltaic 40 hr Entry Level** This instructor led 40 hour course is designed to introduce the elements of a properly designed and installed solar PV system, to prepare individuals for an entry level position with a solar PV company, and to prepare individuals to take the NABCEP Entry Level Exam. This course will closely follow the NABCEP PV Entry Level learning objectives to include PV markets & Applications, Safety Basics, Electrical Basic, Solar Energy Fundamentals, PV Module Fundamentals, System Components, PV System Sizing Principles, PV System Electrical Design, PV	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	System Mechanical Design, Performance Analysis and Troubleshooting.	
MAINE - Fairfield **Augusta Electrical JATC** 176 Main St. Fairfield, ME 049372 **Contact/Instructor(s)**: Christopher Trider **Tele.** (207) 453-0135 **Email:** chris@ibew1253.org **www.ibew1253.org/JATC.htm**	**Photovoltaic Power Systems – Design, Installation & Maintenance:** The course consists of 60 contact hours and is a combination of lecture and classroom plus hands-on installation of a system installed on a simulated roof in the training facility then interconnected to a mock service. Students will actually install the system and tie it into the service equipment provided for utility provided power. Grid-tied systems shall be compared to stand-alone systems with a strong focus on service interconnection.	
MAINE - Fairfield **Kennebec Valley Community College** 92 Western Avenue Fairfield, ME 04937 **ON-LINE OPTION!** **PV Contact:** Michael Paradis, PV Instructor **Email:** mparadis@kvcc.me.edu **Tele.** (207) 453-5819 **SH Contact:** Bradley Harding **Email:** bharding2@kvcc.me.edu **Tele.** (207) 453-5817 **www.kvcc.me.edu**	**Solar PV for the Entry Level Candidate** This course is geared toward individuals who have limited experience with solar PV systems and are interested in developing their understanding of solar PV technology. Upon completion, students will be eligible to take the NABCEP PV Entry Level exam. Successful completion of this course and a passing score on the NABCEP exam will provide a required credential for professionals who want to install systems that qualify for the Efficiency Maine Trust Solar PV rebate program. Students will be expected to have basic electrical skills, and basic knowledge of roofing materials and construction.	**Solar Heating for the Entry Level Candidate** **This course is geared toward individuals who have limited experience with solar heating systems and are interested in expanding their understanding of solar heating technology. Upon completion, students will be eligible to take the NABCEP Solar Heating Entry Level Exam Successful completion of this course and a passing score on the NABCEP exam will provide a required credential for professionals who want to install systems that qualify for the Efficiency Maine Trust Solar Heating rebate program. Students will be expected to have basic plumbing and electrical skills, and basic knowledge of roofing materials and construction.**
MAINE – Presque Isle **Northern Maine Community College** 33 Edgemont Drive Presque Isle, ME 04769	**Photovoltaic Systems** This course is designed to provide students with an understanding of Solar Photovoltaic Systems and installation of the different types of Solar Photovoltaic Systems used.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Contact: Pamela Buck (207)768-2763 Pbuck@nmcc.edu **www.my.nmcc.edu/ICS.edu**	Understanding and applying the most current National Electrical Code standards are taught in this course. The course will cover all of the major topic areas that make up the North American Board of Certified Energy Practitioners (NABCEP) entry level PV installer certification exam.	
MAINE - South Portland **Southern Maine Community College** 2 Fort Road South Portland, ME 04106 **Contact:** Jamie McGhee, Instructor **Email:** jmcghee@smccme.edu **Tele.** (207) 741-5878 **www.smccme.edu**	**ELEC-265 Renewable Energy Resources** This is a 45 hour intensive training that covers the essentials of photovoltaic technology and includes substantial hands-on time. Both grid-direct and battery based systems will be covered. The goal of the course is to create a fundamental understanding of the core concepts necessary to work with all PV systems, including: basic electrical theory, system components, site analysis, PV module criteria, mounting solutions, safety and commissioning. The course will also cover the basics of sizing a residential grid-direct system, wire sizing, over-current protection, and grounding. This course is designed to meet the learning objectives for the NABCEP PV Entry Level Exam. Class size limited to 14 students.	
MARYLAND - Hagerstown **Hagerstown Community College** 11400 Robinwood Drive Hagerstown, MD 21742 **Contact:** Jack Drooger **Email:** jadrooger@hagerstowncc.edu **Tele.** 240-500-2453 **www.hagerstowncc.edu/coned**	**Solar PV Installation** Learn how to design and install solar PV systems. This course covers skills and abilities that every installer of PV systems should have. Class will concentrate on practical knowledge and skills including site analysis, sizing and locating, system components, and other installation considerations. Basic electrical systems concepts, how PV systems work, applied math examples, safety considerations, and a discussion on codes and ordinances are included. Students will get hands-on experience using tools and calculators used for the design and installation of PV systems.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
MARYLAND - Lanham **JATC Local 26** 4371 Parliament Place, Suite A Lanham, MD 20706-6945 **Contact:** Thomas C. Myers **Email:** Tmyers@jatc26.org **Tele.** 301-429-6945	**Renewable energy Theory and Application**: This course is an introduction to renewable energies for our journeymen and apprentices. Of the 14 sessions of classroom instruction, one-half will concentrate on photovoltaic theory and principle and the balance will be an intro into other renewable and leading edge technologies that will affect the electrical trade in the future	
MARYLAND - Odenton **IEC Chesapeake Apprenticeship & Training, Inc** P.O. Box 147 1424 Odenton Road, Suite 2B Odenton, MD 21113 **Contact:** Grant Shmelzer **Phone:** (800) 470-3013 **Website:** iec-chesapeake.com	**Photovoltaic (PV) Entry Level Prep and Examination** *(for existing electricians)* This course will prepare existing electricians interested in entering into the solar field and seeking to take the North American Board of Certified Energy Practitioners (NABCEP) Entry Level Exam, which is a two-hour, 60-question comprehensive exam for Photovoltaic (PV) Systems. This class is compact and fast-paced, reviewing the current primary learning objective skill-sets developed by NABCEP's Committee of PV subject matter experts for the entry-level exam. Students successfully completing the course and passing the entry-level exam will have demonstrated that they have acquired a basic understanding of the fundamental principles in the application, design, installation and operation of grid-tied and stand-alone PV Systems. **Photovoltaic (PV) Entry Level Prep and Examination** *(limited or no knowledge of PV systems)* This 40-hour prep course is geared towards individuals seeking a career in the solar market that have limited or no knowledge of PV Systems. Overall, this course will give students a strong foundation and better understanding of PV Systems and the solar electric market as students learn more about the	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	NABCEP learning objective skill-sets that are associated with the NABCEP Entry Level Exam. This course will prepare students to take the North American Board of Certified Energy Practitioners (NABCEP) Entry Level Exam, which is a two-hour, 60-question comprehensive exam for Photovoltaic (PV) Systems. Students successfully completing the course and passing the entry-level exam will have demonstrated that they have acquired a basic understanding of the fundamental principles in the application, design, installation and operation of grid-tied and stand-alone PV Systems.	
MARYLAND - Rockville **Montgomery College** Gudelsky Inst. For Technical Education 51 Mannakee St. Rockville, MD 20850 **Contact :** John Phillips **Email :** john.phillips@montgomerycollege **Phone** (240) 567-7942 **www.montgomerycollege.edu**	**Solar PV Design & Installation** Learn the fundamentals necessary to design & install a solar photovoltaic system. This course will cover residential PV systems including layout, installation, equipment, permitting & NEC issues, as well and financial & environmental incentives.	
MASSACHUSETTS - Boston **Benjamin Franklin Institute of Technology** Dept. of Electrical Technology 41 Berkeley Street Boston, MA 02116 **Tele.** (617) 423-4630 **www.Bfit.edu**	**EL243: Photovoltaic Design and Installation:** This 4 credit course introduces students to the basic principles of photovoltaics. Topics will focus on site selection, panel types, storage centers, system design, and system application. Upon course completion, students will be able to install basic systems in accordance with the National Electrical Code, OSHA and BOCA. Traditional classroom setting including a combination of lecture and lab hours.	
MASSACHUSETTS - Fall River **Bristol Community College** Center for Workforce and Community Education	**Photovoltaic System Design and Installation** This 60 hour course provides the theoretical and technological knowledge base for a fundamental understanding of solar PV	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
1082 Davol Street, 2nd Floor Fall River, MA 02720 **Contact:** Elizabeth Wiley, Director, The Green Center **Email:** Elizabeth.wiley@bristolcc.edu **Tele.** (508) 678-2811 ext. 2565 www.bristol.mass.edu www.bristolcc.edu/noncredit.edu search under green training	technology. Based on NABCEP learning objectives, the course prepares those interested to sit for the industry-recognized NABCEP Entry-Level Exam. The test, which consists of 60 multiple choice questions, takes approximately 2 hours to complete. The test will be administered on the last day of the course. The cost of the test is $100. [15 weeks, one 3-hr. class per week, evenings, plus two 7.5-hr. Saturday sessions]	
MASSACHUSETTS - North Adams **North Berkshire Vocational School District** 70 Hodges Cross Road North Adams, MA 01247 **Contact:** James J. Brosnan, Superintendent **Tele:** (413) 663-5383 **Email:** jbrosnan@mccanntech.org **www.mccanntech.org**	**Photovoltaic (PV) Entry Level Program** This program will explain the basic fundamentals for photovoltaic systems. It will introduce students to PV markets and applications, general and electrical safety basics, solar energy fundamentals, PV module fundamentals, system components, PV system sizing principles, PV system electrical design, PV system mechanical design and performance analysis, maintenance and troubleshooting. Students will be able to sit for the exam at the end of the course.	
MASSACHUSETTS - Pittsfield **Berkshire Community College** 1350 West Street Pittsfield, MA 01201 **Contact:** Denise Johns **Tele:** (413) 236-2125 **Email:** djohns@berkshirecc.edu **www.berkshirecc.edu**	**Principles of PV Installation** This course is intended to provide the technical knowledge and practical experience required for entry into the field of PV systems. Participants are expected to come from tradesman, particularly those in the electrician's trade, who are interested in expanding their expertise into solar energy systems. A major goal of this course is to fulfill a significant part of their training for entry into the field. To meet this goal, this course was designed in concert with the guidelines (Learning Objectives) of NABCEP.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
MASSACHUSETTS - West Barnstable **Cape Cod Community College** 2240 Iyannough Road West Barnstable, MA 02668 **Contact:** Valerie Massard, Program Coordinator, Environmental Technology & Clean Energy **Email:** vmassard@capecod.edu **Tele:** (508) 362-2131 x4468 www.capecod.edu	**ENV173: Introduction to Solar Energy** Students in this course gain an understanding of the solar energy resource and how it can be utilized for a variety of energy demand applications in residential, commercial, and municipal buildings. The benefits and limitations of various solar energy technologies that aer commonly used to produce heat, hot water, and electricity are examined. Students learn how to properly site, size, design, and specify solar hot water and solar electric systems. Students also learn how to perform an economic and environmental analysis of proposed systems. **ENV178: Photovoltaic Installation** This course introduces students to the fundamentals of photovoltaic (PV) system installation and maintenance procedures. The class is divided between classroom based lectures/activities and project based activities involving the installation of a residential scale PV system. Students who complete this course are eligible to take the NABCEP Entry Level Solar PV exam (for an additional fee).	
MASSACHUSETTS - Worcester **Quinsigamond Community College** 280 May Street Worcester, MA 01602 **Contact:** Mary Knittle **Email:** mknittle@qcc.mass.edu **Tele.** (508) 751-7904 **qcc.mass.edu** **cce.qcc.mass.edu**	**PV Installer Boot Camp** This 40-hour Boot Camp covers the PV system concepts required by entry-level designers, installers, sales consultants, estimators and inspectors. The boot camp is instructor-led and is geared to individuals wishing to take the industry-standard exam for entry-level solar professionals: the NABCEP Entry Level Exam of PV Systems. The boot camp instruction includes lecture presentations with hands-on exercises.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
MICHIGAN - Ann Arbor **HeatSpring Learning Institute** 401 Stadium Blvd. Ann Arbor, MI 48104 **Contact:** Brian Hayden, Director of Education **Email:** bhayden@heatspring.com **Tele.** (800) 393-2044 ext. 44 www.heatspring.com/courses/solar-pv-installer-boot-camp-training--online **ONLINE Option**	HeatSpring's Solar Installer Boot Camp teaches students to design, install, and sell solar PV (electric) systems. Five days of intense training are split between two days of online assignments, plus three days in the classroom. Classroom time includes hands-on design and installation exercises with a full demo array. Students have the option of taking the NABCEP Entry Level Exam at the conclusion of the course, or coming back at a future training date to take the exam.	**Solar Thermal Systems -Online** **This 40-hour online training teaches the fundamentals of solar thermal design and installation. Videos, reading, webinar, homework, quizzes and discussion provide a range of media for varying learning styles. Instructor Bob Ramlow is an ISPQ Certified Independent Master Trainer – his book, *Solar Water Heating*, provides the backbone of the material. The course prepares students for the NABCEP Solar Heating Entry level Exam.** **Solar Thermal Systems –Blended Learning Option** **This 40-hour training, is also taught by ISPQ Certified Independent Master Trainer, Bob Ramlow.** • **Days 1 & 2 (16 hours) will be conducted online in an interactive distance-learning format. Reading worksheets, quizzes and discussion will focus heavily on SHW fundamentals, safety, and markets.** **Days 3, 4 & 5 (24 hours) will be conducted in the classroom. The existing course will be modified to go deeper in critical topics to compliment the online instruction.**
MICHIGAN - Chelsea **Ann Arbor Electrical JATC** 13400 Luick Dr. Chelsea, MI 48118 **Contact:** Jeffrey Grimston, Training Director **Email:** jatcjgrim@aol.com **Tele.** (734) 475-1180 **Instructor:** Robert Kosky **www.aaejatc.org**	The course offered by the Ann Arbor Electrical JATC is based on the text Photovoltaic Systems by Jim Dunlop. The course starts with a discussion of semiconductor materials that are used to manufacture PV cells including manufacturing techniques and concerns. Sun-earth relationships and how they affect the gathering of solar radiation make up the basics of array orientation and explain the reason for site surveys. Site survey techniques, tools, test equipment, and forms are described and applied to teach the student how to gather the data needed to start the design of a PV system. System configurations	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	and components are discussed and compared to the National Electrical Code requirements for each type of system. System sizing, mechanical integration, electrical integration, utility interconnection, permitting and inspection, commissioning, maintenance, troubleshooting, and economic analysis form the balance of the course.	
MICHIGAN - Traverse City **Northwestern Michigan College** NMC-EES 1701 E. Front St. Traverse City, MI 49686 **Contact: Bill Queen, Carol Evans** **Email:** BQueen@nmc.edu **Tele.** (231) 995-1701 **www.nmc.edu/ees**	**Photovoltaic (Solar) Electric Systems One-week intensive –** **NABCEP Entry Level:** Learn the fundamentals of PV system design and installation in this 40-hour workshop designed for those interested in the expanding PV industry. In NMC's state-of-the-art Energy Demonstration Center you will gain a technical foundation in stand-alone and grid-tied code compliant solar electric systems. The course content will follow NABCEP's learning objectives for the Entry Level exam.	**Solar Hot Water Heating Systems – One Week Intensive EEVE139** **Jump start your career selling or installing solar hot water heating systems by attending this one-week workshop. Work with flat plate and evacuated tube solar collectors, storage tanks, pumps, piping, and controls and learn essentials to building a system. Content integrates the solar thermal core competencies outlined by NABCEP and will cover the following topics:** **Conducting site analysis, including load analysis** **Identifying solar hot water safety practices, standards, codes & clarification** **Identifying systems for specific climates and applications** **Identifying proper orientation and installation methods** **Identifying proper use of balance of system components and materials** **Identifying common SH maintenance items** **Designed for builders, plumbers, architects, code officials, construction and energy related business owners, anyone who needs technical literacy in solar thermal energy.**
MICHIGAN - Warren **Detroit JATC** 2277 E. 11 Mile Road, Suite 1 Warren, MI 48092 **Contact:** Thomas W. Bowes	**Photovoltaic Systems (course)** **Photovoltaic Seminar (workshop)** Note: These are journeyman level training courses which will be offered only to persons with 4+ years' electrical experience. Courses cover loads, site surveys, system sizing, inverter and string sizing,	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Email: tomb@det-ejatc.org **Tele.** (586) 751-6600	support systems, module testing, mounting, cabling, grounding, hardware, combiner boxes, string OCPD, utility requirements, net metering, commissioning, data acquisition, electrical code, & safety.	
MINNESOTA – Coon Rapids Anoka-Ramsey Community College Steve Jones763-433-1683 **Stephen.Jones@anoka-ramsey.edu** **www.ProWorkTraining.Com**	**Basic Solar PV Systems** Participants will learn the fundamental makeup of solar PV generation. This will include solar cell technology and the fundamentals of inversion technologies and performance dependencies. The primary reference is the Solar Electric Handbook - Photovoltaic Fundamentals and Applications through Solar Energy International.	
MINNESOTA - Hibbing **Hibbing Community College** 1515 East 25th Street Hibbing, MN 55746 **Contact**: Michael Raich Dean of Academic Affairs and Student Services **Email:** michaelraich@hibbing.edu **Tele.** (218) 262-6702 **Instructor:** Jesse Dahl jessedahl@hibbing.edu	**ELM2401 Photovoltaic Systems Theory and Design** Photovoltaic (PV) Systems Theory and Design covers the introduction of photovoltaic fundamentals, terms, applications and applicable National Electrical Code articles. This is the first of two courses to prepare students for the NABCEP Entry Level PV exam. **ELM 2402 Photovoltaic Systems Installation, Maintenance and Troubleshooting** Photovoltaic (PV) Systems Installation and Maintenance covers the installation and commissioning of various photovoltaic systems and applicable National Electrical Code articles. This is the second of two courses to prepare students for the NABCEP Entry Level PV exam.	
MINNESOTA - Minneapolis **Minneapolis Community and Technical College** 1501 Hennepin Ave. Minneapolis, MN 55403 **Contact: Greg Skudlarek**	**Introduction to Solar PhotoVoltaics** This course covers the basics of photovoltaic solar energy systems. You will receive hand-on training and experiment with simulated lab projects involving solar photovoltaic systems.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Email: Greg.Skudlarek@minneapolis.edu **Tele.** (612) 659-6424	Must be in or have completed an accredited electrical training program.	
MINNESOTA - Minneapolis **Minneapolis Electrical JATC** 13100 Frankfort Parkway NE St. Michael, MN 55376 **Contact/Instructor(s)**: Daryl Thayer **Email:** daryl_solar@yahoo.com **Tele.** (612) 229-4381	**Solar Electric Basic:** Teaches principles of photovoltaic electrical theory, system design and installation. Also electrical-optical-thermal performance of PV cells & modules, system types and components, mounting PV arrays and related code. **Solar Electric Advanced:** Covers the NEC issues in solar installation and focuses on the utility grid interactive PV systems. Topics include safety, AC/DC grounding, wiring methods, inverter use and selection.	
MINNESOTA - St. Paul **St. Paul Electrical JATC, IBEW Local 110** 1330 Conway Street St. Paul, MN, 55106 **Contact/Instructor(s)**: Edward Nelson, Assistant Training Director **Email:** ENelson@ibew110.org **Tele.** (651) 772-8773	**Solar Course:** Students in this course will learn the fundamental solar theory of the conversion of light energy into electrical energy. Topics covered but not limited to include module construction, definitions, site selection, sizing arrays, BOS (Balance of system) equipment, system installation, NEC (National Electrical Code) rules and troubleshooting. Both battery and grid connected systems are covered in detail. Lab time will include actual mounting of support system and modules on two different roof covering, grid tie connection to premise wiring and troubleshooting techniques. Students will also use a SunEye to determine the best location for the array. Upon completion of the course the students will be prepared to take NABCEP's entry level certificate test.	
MINNESOTA - St. Paul **St. Paul College**	Entry-level course in Photovoltaic systems and PV Entry Level Exam. This seven (7) day series, 56 hours	

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Customized Training and Continuing Education 60 East Plato Boulevard Drake Building, Suite 150 St. Paul, MN 55107 **Contact:** Cheryl Beaumier **Email:** cheryl.beaumier@saintpaul.edu **Tele.** 651-846-1438 **Instructor**: Daryl Thayer **training.saintpaul.edu**	of training consists of class room lecture, computer analysis, to hand-on demonstrations and problem solving using Solar PV equipment. Ten (10) essential skill-sets of Learning Objectives are provided. They are as follows: • PV Markets and Applications • Safety Basics • Electricity Basics • Solar Energy Fundamentals • PV Module Fundamentals • System Components • PV System Sizing • PV System Electrical Design • PV System Mechanical Design • Performance Analysis and Troubleshooting	
MINNESOTA – White Bear Lake Century College Scott Randall 320-259-4893 Scott.randall@century.edu **www.century.edu**	**Solar Energy** We offer a 16 credit solar site assessment certificate which covers basic installer and site assessment knowledge and skills. We also offer a 32 credit advanced solar PV certificate that covers in depth PV design and preparation for the NABCEP installers exam.	
MISSOURI - Bridgeton **St. Louis Community College** 3221 McKelvey Road Bridgeton, MO 63044 **Contact:** Rene Dulle, Sr. Project Coordinator – Sustainable Technologies **Email:** rdulle4@stlcc.edu **Tele.** (314) 539-5296 www.stlcc.edu	**Solar Photovoltaic Installation Fundamentals** This program prepares students to compete for entry-level positions in the solar electric industry. Students will gain fundamental knowledge and hands-on training in installing solar PV systems. In addition, basic principles of solar sales and National Electric Code will be included. Students will have the opportunity to ear OSHA 10 certification and prepare for the NABCEP PV Entry Level Exam.	
MISSOURI - Kansas City **Metropolitan Community College** Institute for Workforce Innovation Continuing Professional Education	**Entry Level Solar Photovoltaic Training** Program is targeted for industry professionals to add solar PV skills to their knowledge base. A mix of traditional classroom, hands-on lab,	

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3201 SW Trafficway Kansas City, MO 64111 **Contact:** John Littleton **Email:** john.littleton@mcckc.edu **Tele.** (816) 604-5419 **www.mcckc.edu**	directed study and industry internship designed to give learners the opportunity to apply new knowledge and skills directly and bring that experience back to the classroom. Learning objectives will include: PV Markets & Applications, Safety Basics, Electricity Basics, Solar Energy Fundamentals, PV Module Fundamentals, System Components, PV System Sizing Principles, PV System Electrical Design, PV System Mechanical Design, and Performance Analysis, Maintenance and Troubleshooting.	
MISSOURI - Neosho **Crowder College** MARET / SOLAR 601 Laclede Neosho, MO, 64850 **Contact:** Joel Lamson, Inst. **Email:** joellamson@crowder.edu **Tele.** (417) 455-5719 **Instructor**: Joel Lamson www.crowder.edu	**Course description pending**	
MISSOURI - Sedalia **State Fair Community College** Renewable Energy Technology 3201 W. 16th Street Sedalia, MO. 65301-2199 **Contact:** Mark Kelchner, Dean, Technical Education and Workforce Innovation **Email:** mkelchner@sfccmo.edu **Tele.** (660) 596-7402 www.sfccmo.edu	State Fair Community College's Renewable Energy Technology Solar Electric program prepares students to pursue careers in the Solar PV industry. The program is structured to provide students with a fundamental understanding of the theory and application of the various types of renewable energy technology. The program enables each student to develop an in-depth understanding of how to design, specify, adapt, implement, configure, install, inspect, and maintain photovoltaic systems, including grid-connected and stand-alone systems, with or without battery storage for residential and commercial applications. The program will offer students both class room and hands on lab experience, as well as an opportunity to install a system on a building. Internship opportunities will be offered. In addition, the	

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	program will emphasize OSHA safety training and detailed understanding of the National Electrical Code as it applies to the installation of Solar PV systems. The curriculum is structured to cover all the objectives for the North American Board of Certified Energy Practitioners (NABCEP) Entry Level Exam.	
MONTANA - Missoula **University of Montana – College of Technology** Department of Applied Computing and Electronics 909 South Ave W Missoula, MT 59801 **Contact:** Beth Shirilla **Email:** beth.shirilla@umontana.edu **Tele.** (406) 243-7916 **Instructor**: Greg Guscio **www.cte.umt.edu**	**NRG243 Fundamentals of Photovoltaic Design & Installation** is an introduction to the basic principles and technologies of solar photovoltaic power generation systems. Emphasis is on system design and installation, including site and resource assessment, calculation of energy inputs and power outputs, load analysis, trouble shooting, and cost analysis. The material covered prepares students for a career in renewable energy or for installing a renewable energy system on their own home. **Prereq./coreq**. EET105 DC Circuit Analysis, or approved equivalents.	
NEVADA - Las Vegas **Southern Nevada Electrical JATC** 62D Legion Way Las Vegas, NV 89110 **Contact/Instructor(s):** Chris Brooks, Robert Buntjer, Guy Snow **Email:** Madison Burnett, mburn93784@aol.com **Tele.** (702) 459-7949	**Photovoltaics Level I**: An introductory class on solar photovoltaics. Topics discussed are: components of a solar system, how and what constitutes the solar power industry, safety, plus hands-on lab time.	
NEW HAMPSHIRE - Laconia **Lakes Region Community College** 379 Belmont Road Laconia, NH 03246 **Contact: Wes Golomb, Mark Weissflog** **Email:** wgolomb@ccsnh.edu	**Entry Level Solar Photovoltaic Installation** This course covers the ten NABCEP Learning Objectives. The course uses “PV Systems” as a text. Mark Weissflog, NABCEP PV Certified Installer, is the instructor. There are ten 3-hour classroom	

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mweissflog@kwmanagement.com **Tele. (603) 524-3207 ext. 763**	meetings and two 8-hour days of field work which include a PV installation.	
NEW JERSEY - Carneys Point **Salem Community College** The Energy Institute 460 Hollywood Avenue CarneysPoint, NJ 08069 **Contact:** Gail Coley, Administrative Assistant **Email:** coley@salemcc.edu **Tele.** (856) 351-2604 www.salemcc.edu	**Solar Photovoltaic Electric Systems:** This course is designed to provide the student with the knowledge necessary to take the NABCEP PV entry level exam. The student will learn the knowledge core for the NABCEP entry level exam (PV). This is an introductory course for individuals wanting to gain employment in the solar pv industry. This is both a classroom/hands-on instructional/format available for non-credit or college credit. 45 hours.	
NEW JERSEY – Jersey City **Eferon Solar Solutions** Louis Nkrumah (201) 744-1930 nkrucomp@aol.com info@eferonschool.com	**Solar Energy Technician** The program is focused on basic PV system design and installation practice. Basic math is taught with reference to algebra and basic geometry. There is insight to NEC codes with respect to real life applications. In class Lab offers a wide range of system analysis and hands on. Basic electricity and balance of system is highly emphasized in our curriculum. We incorporates field trips and all students are prepared for the NABCEP entry level exams with prospect of job placement.	
NEW JERSEY - Piscataway **Rutgers University** 96 Frelinghuysen Road Piscataway, NJ 08854 **Contact:** Stephen Carter **Email:** scarter@rutgers.edu **Tele.** (732) 445-4700	**Solar PV Bootcamp** This 40-hour program includes the basics of the PV market, PV system components, electrical basics, safety, PV system sizing considerations, PV siting, and performance analysis/troubleshooting. The course includes hands-on training with a solar cart.	
NEW JERSEY - Tinton Falls **Warshauer Electric Supply**	**Introduction to Photovoltaic Systems** In this course, we will look at the	

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800 Shrewsbury Avenue Tinton Falls, NJ 07724 **Contact:** Kennie Marie Fried, Marketing Coordinator **Email:** kmf@warshauer.com **Tele.** (732) 741-6400 **www.warshauer.com**	basics of how to site, design and install photovoltaic (PV) systems. The course includes sizing systems for both grid-connected and off-grid PV systems. We will look at the solar resource, the problems associated with shading, and what is the best orientation and tilt for PV arrays. We'll discuss the basic sizing and design of systems to serve a given electrical load. We'll go over safety practices for installers and study the requirements of the National Electrical Code (NEC) for PV systems in some detail. We will study various mounting systems for PV arrays and how they affect roofs. We will assemble a PV system in the school facility."	
NEW JERSEY - Washington **Warren County Community College** 575 Route 57 West Washington, NJ 07882 **Contact:** Maija Amaro, Workforce and Industry Training Specialist **Email:** mamaro@warren.edu **Tele.** (908) 835-4029 **www.warren.edu**	**Introduction to Solar Photovoltaics** The course will be instructor led by a NABCEP Certified PV Installer. The course will cover all entry level learning objectives and presentation of real solar installations will be featured to help reinforce the objectives. Emphasis on safety will be provided along electrical safety principles of using typical test equipment on a job site.	
NEW MEXICO – Albuquerque **Central New Mexico Community College** 5600 Eagle Rock Ave. Albuquerque, NM 87113 **Contact**: Evelyn Dow Simpson Associate Director, Workforce Training Center **Email:** evdow@cnm.edu **Tele.** (505) 224-5217 www.cnm.edu	**Module 1: Introduction to Solar Energy and Solar Electricity** – This class is perfect for the non-technical beginners working with PV (i.e. sales, customer service, manufacturing and support staff) or individuals who would like to get into the field, in addition to Journeyman Electricians and Electricians. This class will also introduce PV Markets and Applications.. (16 hours) **Module 2: General PV and Installation** - This class includes basic electricity and safety, system sizing, and basic PV electrical and mechanical design. Includes hands-on lab. (24 hours) Successful	**Intro to Solar and Solar Thermal Fundamentals/Solar Thermal Installation** **The intent of the intro class is to equip the student with the knowledge and skills needed to design, install, and operate and maintain the most common types of solar thermal systems. The class will present an overview of solar thermal applications, provide basic information on the principles of solar energy, and review solar thermal technologies.** • **The installation class will cover both solar hot water and solar pool heating systems. This theory, code,**

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	completion of Module 1 and 2 will prepare the student to sit for the entry level NABCEP* exam for Solar PV Systems. CNM School of Applied Technologies offers 4 college credit classes in the field of photovoltaic installation. Upon completion, the four classes result in 12 college credit hours and a certificate of completion. These classes are designed for students with an electrical background, either journeyman electricians or students who have completed a minimum of two terms of Electrical Trades training. This series of courses offer extensive coverage of photovoltaic theory, design, safety, and installation, including a hands-on lab. The classes offered are: *ELTR 2610 PV Installation Safety; ELTR 2620 PV Theory, Design, and Installation; ELTR 2692 PV Installation Lab*; and *ELTR 2630 Advanced PV Theory, Design, Installation, Maintenance and Commissioning.*	**and hands on training is designed for industry professionals wanting to add solar thermal systems to their offerings and for individuals seeing certification for career advancement with the solar industry. The course blends theory with applied practice.**
NEW MEXICO – Las Cruces **Dona Ana Community College** 2345 E Nevada Ave. Las Cruces, NM 88001 **Contact:** Daniel Reynolds **Email:** Dreynolds@dacc.nmsu.edu **Tele. (**575) 528-7456 dabcc.nmsu.edu/tis/eeth/	**TCEN 110. Photovoltaic Application** TCEN 110. Photovoltaic Application 4 cr. (3+2P) This course will provide an introduction to Photovoltaic (PV) installation. The course will provide instruction on: Site Selection, System Design, Installation, and maintenance for photovoltaic applications. Students that complete the course and have the opportunity to take the entry level exam with the NABCEP)en route to becoming Certified Installers.	
NEW MEXICO – Santa Fe **Santa Fe Community College** 6401 Richards Ave. Santa Fe, NM 87508	**Introduction to Renewable Electrical Energy Systems** Topics include: renewable energy systems; solar/PV; wind and water systems; existing technologies; history; cost per watt-hr vs.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Contact Director of Workforce Development: Randy Grissom **Email:** randy.grissom@sfcc.edu **Tele.** (505) 428-1641 **www.sfccnm.edu**	conventional power; application; electrical energy production; wind farms; solar electrical power plants; work possibilities in the field.	
NEW MEXICO – Silver City **Western New Mexico University School of Applied Technology** 1000 West College P.O. Box 680 Silver City, NM 88062 **Contact**: Tony Macias, Dean, School of Applied Technology **Email:** maciast@wnmu.edu **Tele.** (575) 538-6301	**Course description pending**	
NEW YORK, Buffalo **Erie Community College** Workforce Development 121 Ellicott Street Buffalo, NY 14203 **Contact: Gene Covelli, Project Director** **Email: covelli@ecc.edu** **Tele: (716) 851-1800 /** **(716) 860-7874**	**PV – Entry Level Photovoltaics (Solar Power)** 40 hour PV Solar Energy Systems Design & Theory preparation course for NABCEP Entry Level Exam. Basics of site design, installation, sizing, safety, mounting types for PV arrays. Curriculum based on NABCEP Entry Level learning objectives. Small class lab activities will be used to demonstrate theory and installation technique.	
NEW YORK, Canton **SUNY Canton** Alternative & Renewable Energy Systems CSOET, NN105 Canton, NY 13617 **Contact/Instructor**: Matthew Bullwinkel **Email:** bullwinkel@canton.edu **Tele.** (315) 386-7411 www.canton.edu/csoet/alt_energy/	**AREA 323 Photovoltaic Systems** This is an on-line course using Dunlop's "Photovoltaic Systems" as text. Course examines the direct conversion of solar energy to electricity. Topics include photovoltaic (PV) cell physics, types of PV cells, PV system components, and PV energy storage. PRE-REQUISITES: MECH 225, Introduction to Thermodynamics or permission of instructor.	**Course Area 321, Solar Utilization** **This course is offered on a semester basis as part of the 4 year degree in Alternative Renewable Energy at SUNY Canton. It includes hands-on, design and follows the NABCEP Installer Job Task Analysis.**

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NEW YORK – Castleton **Questar III -Rensselaer Columbia Greene BOCES** 10 Empire State Blvd Castleton, NY 12033 Amina Drine (518) 479-6895 admissions@questar.org	**PV Installer Course with NYSERDA Internships** The Questar III adult education workforce Photovoltaic course is a joint project of Questar III, NYSERDA and Century Solar Supply. It is a comprehensive course designed to provide the classroom and hands on instruction needed to sit for the NABCEP Entry Level Photovoltaic exam. Through a grant from NYSERDA, the course includes 140 to 240 hours of a paid internship that will be completed during the 16 week semester. The course also includes OSHA 10 training. For those students needing assistance in obtaining internships and more preparation a Certificate of Employability will also be offered.	
NEW YORK - Copiague **Electrical Training Center, Inc.** 65 Elm Street Copiague, NY 11726 **Contact**: Salvatore Ferrara **Instructor:** Jerry Flaherty **Email:** sal@electricaltrainingcenterLI.com **Tele.** (631) 226-8021	**Basic Designing and Installing Solar Photovoltaic Systems -** This dynamic 46 hour course is designed to train electrical contractors, journeymen, and other skilled trades' people in designing and installing solar photovoltaic systems. This is an intense all inclusive course that will cover solar and electrical theory, practical installation methods and techniques, PV business management and concludes with the installation of a grid connected solar photovoltaic system. This course employs both classroom lecture and hands-on training. We offer this course at night and one Saturday; we also offer this course as a six day intensive course. "Basic Designing and Installing Solar Photovoltaic Systems" fulfills the New York State Energy Research and Development Authority (NYSERDA) requirements for installers and preparing our students to take the NABCEP PV Entry Level Exam. "Basic Designing and Installing Solar Photovoltaic Systems" teaches the 10 NABECP learning objectives	

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	in 11 sessions as outlined below: 1) Overview of Solar Photovoltaics – PV history & applications and PV systems 2) Solar Fundamentals – Solar definitions, function and light to electric 3) Site Assessment – Information gathering, what to look for and best location 4) Evaluating solar irradiance-Array tile, orientation, shading and sizing PV array 5) Electrical Aspects of PV – AC/DC circuits, series-parallel circuits, sizing systems 6) Safety Considerations-OSHA - electric, roof and general worksite safety 7) Building Codes and the 2008 NEC pertaining to PV 8) Putting it together – Design complete PV system to be installed 9) Installing a residential or commercial PV system (8 hours) 10) Photovoltaics incentives and rebates – LIPA & NYSERDA programs 11) Running Your PV business – A look at a PV contractors day Hands-on experience installing a grid-tied and battery based system	
NEW YORK - Delhi **SUNY Delhi** 146 Bush Hall 2 Main Street Delhi, NY 13753 www.delhi.edu **Contact**: Glenda Roberts **Email:** robertgv@delhi.edu	Five-day course designed for those who have an interest in PV and want to learn how to design and install a PV system. • Basics of electricity and PV • Site survey • Selection of proper PB equipment and balance of system components • Proper construction techniques • Voltage drop considerations and wire sizing • NEC requirements	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Tele. (607) 746-4548	• Safety issues • Battery safety	
NEW YORK - East Farmingdale **Molloy College** 7180 Republic Airport East Farmingdale, NY 11735 **Contact**: Louis Cino, Dean/Division of Continuing Education **Email:** lcino@molloy.edu **Tele.** (516) 678-5000 x6357 **www.molloy.edu**	**Photovoltaic Installation and Design Course** This class will prepare students for the NABCEP Entry Level Exam. Our course will focus on topics such as Photovoltaic System Design and review, a hands-on PV Installation and Battery Workshop, detailed Mathematics and Electronic Theory, Worker Safety and Managing Electronic Hazards. This 40 hour course is spread over 5 days and each class is 8 hours. Working with a team of instructors, students will get the most out of this hands-on solar learning session. Also, our instructors will be able to pay attention to individual questions there might be. A copy of Photovoltaic Systems and Photovoltaic Design and Installation Manual will be provided for each student to further enhance their learning experience. In-class instructors will show students all the tools of the trade along with interactive exercises on how to use each one. Our class size is limited to 18 students and after our course is completed students must pay a $100 exam fee that is not covered by tuition.	
NEW YORK - Elmsford **Southern Westchester BOCES** 85 Executive Boulevard Elmsford, NY 10523 **Contact**: Harry J. Kaplan, Supervisor **Email:** hkaplan@swboces.org **Tele.** (914) 592-0849	**Introduction to PV Technology** A theoretical basis for understanding the function of photovoltaic systems including history of PV, types of PV systems, system components and safety. **PV Installers Course** A hands-on course including system and component design and sizing, load analysis, system placement, installation methods, code compliance and safety.	
NEW YORK - Farmingdale **SUNY Farmingdale**	**Design, Installation and Maintenance of Grid Connected PV Systems:** Offering:	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
2350 Broadhollow Road Farmingdale, NY 11735 **Contact/Instructor**: Adam Filos **Email:** filiosaa@farmingdale.edu **Tele.** (917) 280-4225	*Workshops on Photovoltaic Systems *Workshops on Solar Thermal Systems *Marketing of Solar Products & Systems *Advanced PV Systems including case studies Workshops are offered in a traditional classroom setting with associated lab and hands-on work.	
NEW YORK – Flushing, Queens **Alliance Computing Solutions** **36-60 Main St. 4th Fl** **Flushing, NY 11345** **Lawrence Ding (917)661-9771** **Lawrence@acs.edu** **www.acs.edu**	**Solar Design & Installation** This course will introduce students to solar industry, PV system design, installation, industry codes and standards. This course consists of lectures, hands on lab, a job site visit, and an opportunity to take the NABCEP Entry Level Exam. Based on the NABCEP Entry Level Learning Objective, the course includes the following: 1. PV Markets and Applications. 2. Safety Basics. 3. Electricity Basics. 4. Solar Energy Fundamentals. 5. PV Module Fundamentals. 6. System Components. 7. PV System Sizing. 8. PV System Electrical Design. 9. PV System Mechanical Design. 10. Performance Analysis and Troubleshooting.	
NEW YORK, Kew Gardens **Access Careers, Queens** 80-02 Kew Gardens Road Level SC1 Kew Gardens, NY 11415-3600 **Contact Person:** Richard Gunasingh **Email:** rgunasingh@aol.com **Tele.** 718-263-0750 **www.accessqueens.com**	**Solar Technician Assistant** The Solar Technician Assistant program provides the student with a solid understanding of PV markets and applications, electricity basics, safety basics, and solar energy fundamentals. It includes extensive hands-on work with PV modules, system components, system electrical and mechanical design, and PV system maintenance and troubleshooting -- leading to NAPCEP certification and entry-	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	level employment as a Solar Technician Assistant.	
NEW YORK - Kingston **SUNY Ulster** Business Resource Center One Development Court Kingston, NY 12401 **Contact Program Coordinator**: Barbara Reer **Email:** ReerB@sunyulster.edu **Tele.** (845) 802-7171 **www.sunyulster.edu**	**Photovoltaics (PV) Installer's Course:** Learn the basics of how to site, design and install photovoltaic (PV) systems. This course includes sizing systems for both grid-connected and off-grid PV systems. Learn about solar resources, the problems associated with shading and what is the best orientation and tilt for PV arrays. Discuss the basic sizing and design of systems to serve a given electrical load. Learn safety procedures for installers and study the electrical code for PV systems in detail. Study various mounting systems for PV arrays and how they affect roof. Actually install a PV system. **Advanced Photovoltaics Systems:** This course is geared toward PV installers and engineers who have experience with photovoltaic systems. The basics of PV will not be covered. Topics discussed will include the future of solar energy systems, review of formulas needed to size PV, how to design a PV system with battery backup, PV mounting systems, calculating wind load, weight load on roofs, mounting, safety on roofs, calculating system efficiency, wire sizing, performance monitoring, shading analysis, troubleshooting and complying with NYSERDA forms and regulations.	**Solar Hot Water Installation & Design** **This course covers equipment such as collectors, tanks, pumps, piping, and controllers and reviews major system designs such as "closed loop pressurized" and "drain back" as well as solar pool heating designs. This course is an 18 hour hands-on training for trades people, engineers, architects, HVAC practitioners and other professionals.**
NEW YORK, Morrisville **Morrisville State College** PO Box 901 80 Eaton Street Morrisville, NY 13408 **Contact:** Christopher Nyberg, Dean, School of Agriculture and Natural	**Basic Electrical Theory for Renewable Energy Practitioners** This course will provide the student with an understanding of basic principles of electricity to include alternating and direct current and Ohm's Law, with an emphasis on DC theory. This course is required for anyone who plans to take Introduction to PV Technology and	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Resources **Email:** nybergcl@morrisville.edu **Tele.** (315) 684-6083 **www.morrisville.edu**	doesn't have the prerequisite knowledge of electrical theory. (20 hrs.) **Introduction to Photovoltaic Technology** Designed for a person with a strong personal interest in PV technology as well as those considering a career in solar electric technology, this course will give you the theoretical basis for understanding the various types of solar electric systems. It will cover the history of solar electricity, current markets and industry status, basic electrical theory, and other considerations necessary for solar electric systems. Detailed study of system components as well as the proper and safe electrical interconnection of these components will include hands-on training exercises and experiments. Local visits to PV related facilities and assembly of real world system examples will reinforce classroom learning. **Prerequisite: Completion of Basic Electrical Theory or equivalent knowledge.** (40 hrs – 24 hours and 16 hours lab) **PV Installer's Course** In this course, students will develop the knowledge and practical skills needed to install utility-connected and offgrid PV systems. Study of electric load analysis, system and component design and sizing, system siting, shading, electrical and mechanical system configuration, safety, and electrical and building code compliance will be supplemented with hands-on system installation. Successful completion of this course will enable the student to sit for the NABCEP PV Entry Level exam. With additional education, training, and installation experience, this certificate can lead to becoming a NABCEP Certified PV Solar Installer. **Prerequisite: Completion of**	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	Introduction to PV Technology or equivalent course with instructor Approval (40 hrs – 24 hours and 16 hours lab)	
NEW YORK, NYC (Bronx) **Bronx Community College** **Center for Sustainable Energy** City University of New York West 181st Street Bronx, NY 10453 **Contact**: Dr. Joseph Bush **Email:** joseph.bush@bcc.cuny.edu **Tele.** 718-933-1608 **www.csebcc.org for this and other Renewable Energy courses offered at Bronx Community College.**	The Center for Sustainable Energy (CSE) has developed the following sequence of classes for Photovoltaic (Solar Electric) Training: • 36-hour Math/Electricity Basics for Photovoltaics • 40-hour Introductory Photovoltaics Design and Installation • Introduction to CAD Drawing for Solar PV and Solar Thermal: Computer Drawing and Design for Solar Systems • Advanced: Grid-Tied Photovoltaics • Advanced: Off-Grid Photovoltaics, with International Emphasis Additional workshops and seminars: • Introduction to Sustainable Technologies and CSE Programs • Solar Professionals Seminars • How to Put Together a Solar Thermal Package • RETScreen Workshop • Streamlining Solar Workshop **40-hour Introductory Photovoltaic Design and Installation** Prerequisite: 36-hour Math/Electricity Basics for Photovoltaics class This is the industry-wide accepted introductory class designed for individuals interested in entering the solar field, and is based on the NABCEP Task Analysis. At the conclusion of the class, CSE offers review sessions and the NABCEP Entry Level Exam for $100. This	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	entry level exam certifies that the student has achieved basic comprehension and application of key terms and concepts of photovoltaic (solar electric) system operations, knowledge that prepares him/her for an entry level job in the industry. (This differs from the Solar Installer Certification Exam.) 40 AIA credits/40 PDH credits	
NEW YORK, NYC, Brooklyn **New York City College of Technology** The City University of New York 300 Jay Street, Howard Building 4th Floor Brooklyn, NY 11201-1109 **Contact:** Carol Sonnenblick **Email:** csonnenblick@citytech.cuny.edu **Tele.** (718) 552-1180 or (718) 552-1181 www.citytech.cuny.edu/academics	**Introductory Solar Energy (PV) Design & Installation** An introductory solar energy overview course taught in accordance with the NABCEP PV entry level learning objectives. Students will recognize and understand components of off-grid and grid-connected PV systems as well as the interlink between design criteria and the economic impact of various options. Students will learn to identify all basic mechanical and electrical components as well as hoe they are attached to the user's property and wired together following appropriate guidelines and codes. Prerequisite: fundamentals of Electricity EMX 090 or permission of the instructor.	
NEW YORK - NYC **Pace University** One Pace Plaza, Suite 424 New York, NY 10038 **Contact:** Sylvia Russakoff, **Email:** srussakoff@pace.edu **Tele. (914) 422-4328** www.pace.edu/pace/ appsrv.pace.edu/pclc/.	**Course description pending**	
NEW YORK - Port Ewen **Ulster County BOCES** P.O. Box 601 Route 9W Port Ewen, NY 12466	**Photovoltaic- Core Sequence of Classes Include** Electrical Theory for Renewable Energy Practitioners Introduction to PV Technology	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Contact: Virginia Carrig **Email:** vcarrig@ulsterboces.org **Tele.** (845) 331-5050 ext 2220 or 2209	PV Installer's Course OSHA Safety Training & Certification PV Technical Sales & Marketing NABCEP PV Entry Level Exam Prep Course NABCEP PV Entry Level Exam	
NEW YORK - Plattsburgh **Clinton Community College** 136 Clinton Point Drive Plattsburgh, NY 12901 **Contact:** Paul DeDominicas **Email:** paul.dedominicas@clinton.edu **Tele.** (518) 562-4144 www.clinton.edu	The course is designed for individuals who are interested in learning the fundamentals of photovioltaic (PV) systems design and installation. The objective of the course is to prepare students for taking the NABCEP Entry Level Exam. The course curriculum is designed to comply with NABCEP's learning objectives for the Entry Level Exam.	
NEW YORK, Rochester **Monroe Community College** 2485 West Henrietta Road Rochester, NY 14623 **Contact**: Kevin M. French **Email:** kfrench@monroecc.edu **Tele.** (585) 292-3739 www.monroecc.edu		**Solar Thermal Certificate Program:** **This program is designed for the student who is seeking an entry level position as a Solar Thermal Installer and Service Technician, and those currently employed in the field of heating, ventilation, and air-conditioning or related areas. The Solar Thermal Certificate Program provides the student with essential information and training to install and work with solar thermal systems. The coursework includes fundamentals of collecting and transferring solar heat, the national Electric, Plumbing, Mechanical, and Building Code, and teaches the principles of a solar thermal system. This entry level certificate will prepare students to take the NABCEP Solar Heating Entry Level Exam.** **Requirements:** **HVA 101 Basic Refrigeration Theory 3 credits** **HVA 102 Air Conditioning Theory 3 credits** **HVA 103 Heating Systems 3 credits**

FACILITY/INSTITUTION	PV COURSES	SH COURSES
		HVA 104 Commercial AC and Heat Pumps 3 credits **HVA 105 Electric & Motor Controls 3 credits** **HVA 202 Boiler Systems 3 credits** **MTH 135 Intro to Technical Math 4 credits** **PHY 100 Preparatory Physics 4 credits** **STT 101 Intro to Solar Thermal 3 credits** **STT 102 Solar Thermal Installation Practices 3 credits** **STT 201 Troubleshooting and Preventative Maintenance for Solar Thermal Systems 3 credits** **Total Credits = 35**
NEW YORK - Selden **Suffolk County Community College** 533 College Road Selden, NY 11784 **Contact:** Jeanne Durso **Email:** dursoj@sunysuffolk.edu **Tele.** 631-451-4470 www.sunysuffolk.edu	**Solar PV Installation & Design** This program will provide the student with the technical and educational skills required to enter the emerging solar industry. It is a 90-hour college certificate program (non-credit) with 45 hours devoted to classroom instruction and 45 hours of hands-on instruction.	
NEW YORK - Syracuse **SUNY College of Environmental Science and Forestry (SUNY-ESF)** 221 Marshall Hall 1 Forestry Drive Syracuse, NY 13210 **Contact:** Sean Nicholson, Program Specialist **Tele.** (315) 470-4882 **Email: scnichol@esf.edu** www.esf.edu/outreach/spare	**SPARE (Solar Power as Renewable Energy) Photovoltaic Installer and Maintenance Training** This is a traditional classroom style, 4-day course from 8am – 5pm covering the basics of how to site, design and install grid-connected and off-grid PV systems. Some topics: the solar resource: problems associated with shading, best orientation and tilt for PV arrays. Discussions of basic sizing and design of systems to serve a given electrical load. Safety practices for installers including study of the electrical code for PV systems in some detail. Study of various mounting systems for PV arrays and how they affect roofs. We will build a working PV system on the lawn.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
NEW YORK - Troy **Hudson Valley Community College** Workforce Development Institute, JRD 137 80 Vandenburgh Avenue Troy, NY 12180 **Contact/Instructor(s)**: Marlene J. LaTerra, Coordinator, Workforce Development Institute **Email**: m.laterra@hvcc.edu **Tele.** (518) 629-4835 **ONLINE Option**	**Hudson Valley's Photovoltaic Installation Certificate program** provides the training students need to enter the growing industry of solar panel installation and maintenance. The New York State Energy Research and Development Authority (NYSERDA) worked with Hudson Valley to develop the program as the agency anticipates a high demand for qualified PV installers with hundreds of PV systems expected to be installed in the upcoming years. The 21-credit hour program consists of required and elective courses in the Electrical Construction and Maintenance A.O.S. degree program. These courses include a basic AC/DC electricity course and residential and commercial construction wiring courses which serve as a foundation for two courses in PV theory and practice. Both the established journeyman electrician looking for advancement and the potential student interested in the renewable energy field can benefit from the Photovoltaic Installation program. **ECMN 210: Photovoltaic Systems Theory and Design (4 credits)** **ECMN 211: Photovoltaic Systems Installation and Maintenance (4 credits)** **PV (Photovoltaic-Solar) Entry Level Exam Preparation:** This is a 40-hour credit-free course designed for individuals who are interested in learning the fundamentals of photovoltaic (PV) system design and installation. The course curriculum is designed to comply with NABCEP's "Learning Objectives" for the entry level exam. Topics Covered: PV Market and Applications; Electricity and Safety Basics; Solar Energy	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	Fundamentals; Hands-On Solar Workshop; System Components; PV System Sizing; PV System Mechanical and Electrical Design; Performance Analysis & Troubleshooting; Course Review & Test Preparation. contact **Workforce Development** to register for this course: (518) 629-4235 or (518) 629-4827.	
NEW YORK - Utica **Mohawk Valley Community College** 1101 Sherman Drive Utica, NY 13501 Contact: Robert Decker **315-792-5632** **rdecker@mvcc.edu** **http://www.mvcc.edu**	Intro to PV Systems In this 40 hour theory and hands-on installation course, solar site analysis, design, layout and installation of photovoltaic (PV) systems are presented. The course is designed to develop student understanding of PV components and systems and their integration into the electrical systems in the home. Grid-tie and off-grid systems will be presented. This course will present basic system sizing and equipment operation information to individuals who desire to ultimately achieve NABCEP certified PV installer status. Upon completion, students may elect to take the NABCEP PV Entry-Level Exam.	
NEW YORK - Utica **SUNY Institute of Technology** 100 Seymour Road, Utica, NY, 13502 **Contact/Instructor(s)**: Elizabeth Rossi **Email**: elizabeth.rossi@sunyit.edu **Tele.** (315) 792-7383 sunyit.edu	Using NABCEP Entry Level Learning objectives, gain knowledge about solar energy. Understand the practical codes, electrical and solar site selection issues involved with photovoltaics: * Power management, economic development, and environmental impacts * PV Module fundamentals and components * PV System Electrical and Mechanical Design * Mock solar roof for hands-on panel manipulation * Safety harnessing and wiring demonstration * Codes and requirements for	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	installation of grid-tied systems Successful completion of this course will prepare the student to take the NABCEP Entry Level Exam.	
NEW YORK - Wellsville **Alfred State College** 2530 S. Brooklyn Ave Wellsville, NY 14985 **Contact:** Craig Clark **Email**: clarkcr@alfredstate.edu **Tele.** (607) 587-3101 www.alfredstate.edu	**PV (Photovoltaic-Solar) Installation & Design:** This is a 40-hour credit-free theory and hands-on installation course where you will learn solar site analysis and installation of photovoltaic systems. This course is to lead a student to understand photovoltaic systems and their components and its integration into the electrical systems of grid-tie or off-grid homes. The course curriculum is designed around the NABCEP's "Learning Objectives" for the entry-level exam. Topics covered: PV Market and Applications; Electricity and Safety Basics; Solar Energy Fundamentals; Hands-On Solar Workshop; System Components; PV System Sizing; PV System Mechanical and Electrical Design; and Performance Analysis & Troubleshooting.	
NEW YORK - Yorktown Heights **Putnam/North Westchester BOCES** 200 BOCES Drive Yorktown Heights, NY, 10598-4399 **Contact:** Alyson Kistinger **Email**: akistinger@pnwboces.org **Tele.** (914) 248-2408 www.pnwboces.org	This one-day workshop is designed to prepare qualified applicants for the North American Board of Certified Energy Practitioners (NABCEP) Entry Level Exam. The class will review the NABCEP Entry Level PV ten learning objectives, on which the exam is based. Those who pass the exam demonstrate a basic understanding of photovoltaic systems suitable for a supervised, entry-level position with a dealer/installer or other PV industry company. PLEASE CALL FOR MORE INFORMATION (914) 248-2430. *Prerequisites: Electrical Theory for Renewable Energy Practitioners, Introduction to PV Technology, PV Installer's Course.*	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
NORTH CAROLINA - Boone **Appalachian State University** Department of Technology Boone, NC 28608 **Contact/Instructor(s)**: Dennis Scanlin **Email:** scanlindm@appstate.edu **Tele.** (828) 262-6361	**Photovoltaic System Design and Construction:** The course will provide a comprehensive overview of the history and contemporary trends in PV technology. Students will learn how to design a complete system and how to safely construct a safe and code compliant system. Traditional classroom with hands-on lab activities and some field work.	**TEC 4628: Solar Thermal Technology** **This course will introduce students to the basic concepts, tools, materials and techniques needed to convert solar energy into heat. Specific technologies to be studied include: domestic solar water heating systems, solar pool heating systems, solar cookers, solar dryers, solar water pasteurization/distillation, solar greenhouses/cold frames, and some house heating systems. The course will enable students to develop skills in the use of tools, materials and processes which effectively and efficiently capture and convert the sun's energy into thermal energy. The course ill include traditional classroom and "hands-on" design, construction and testing activities.**
NORTH CAROLINA, Candler **Asheville-Buncombe Technical Community College (A-B Tech)** Global Institute for Sustainability Technology (GIST) 1463 Sand Hill Road Candler, NC 28715 **Contact**: Haven Hanford **Email:** hhanford@abtech.edu **Tele.** (828) 254-1921 x5858	**The Fundamentals of Photovoltaic System Design and Construction** A six-day course covering the NABCEP PV Entry level Learning Objectives.	
NORTH CAROLINA - Charlotte **Central Piedmont Community College** Department of Geomatics & Sustainability PO Box 35009 Charlotte, NC, 28235-5009 **Contact:** Rose Mary Seymour **Email:** rosemary.seymour@cpcc.edu **Tele.** (704) 330-6738	**ELC 220 Photovoltaic Systems Technology and Design:** This curriculum course introduces students to the concepts, tools, techniques and materials needed to design and construct systems that convert solar energy into electricity with photovoltaic (pv) technologies. Course work includes site analysis for system design, building code recognition and advances in photovoltaic technology. Upon completion of this course, students will understand the principles of photovoltaic technology and its application within the industry.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
www.cpcc.edu/cfs	**ENV 7200 Solar Photovoltaics for the New Clean Energy Economy:** This continuing education course is intended for individuals who understand the basics of electricity and electric generation, this class will focus on detailed functionality of photovoltaic (PV) system components, and all common PV systems, from straight water pumping to stand alone battery based systems, and grid tie PV with and without batteries. Students will be able to design and size these systems, and see what is involved with interconnection to the utility.	
NORTH CAROLINA - Charlotte **National Institute of Training & Education, LLC** 5960 Fairview Rd., Suite 400 Charlotte, NC 28210 **Contact:** Edlin Kim **Email:** EKim@NITE.com **Tele.** (646) 915-5308 **www.nationalsolartrainers.com** **ONLINE Option**	**Solar PV Bootcamp –** This course gives students the in-depth knowledge any solar professional needs to know and qualifies them to sit for the sought after NABCEP entry level exam. The course even goes beyond covering the NABCEP entry level requirements to feature an extensive hands-on focus, giving students a unique experience with live demonstrations and working installations. The major portions of this course are fundamentals, sales and estimation, design and installation. This course makes students eligible for commercial-scale PV workshops and webinars focusing on knowledge specific to solar career paths in design, finance, and project management.	**Solar Thermal Entry Level Program** **Total course hours: 40** **Number of Hands-on hours: 16** **Lecture hours: 24** ***Or* Online hours: 24** **Solar Thermal Fundamentals Outline – 8 hours** **Solar Thermal Sales Outline – 8 hours** **Solar Thermal Installation Outline – 16 hours** **Solar Thermal Sizing and Design Outline – 8 hours**
NORTH CAROLINA - Durham **Durham Technical Community College** Continuing Education Department 1637 Lawson Street Durham, NC, 27703 **Contact:** Jacqueline Mitchell **Email:** mitchelj@durhamtech.edu **Tele.** (919) 536-7222 x4013	**Solar Technology** - Classroom instruction and hands-on lab will teach students practical design criteria, installation guidelines, safety issues, maintenance, and legal considerations of PV systems. The program is designed for those individuals wanting to get into the solar field; it is a way for them to show they have achieved basic knowledge comprehension and application of key terms and concepts of photovoltaic (solar electric) system operations. The Entry Level Achievement Document	

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	demonstrates that the student has passed an industry-designed exam based on learning objectives developed by subject matter experts. As the market grows for photovoltaics, students who have passed this industry-sponsored Entry Level Exam may find that their employment opportunities are enhanced by starting the job with an understanding of the basic terms and operational aspects of a PV system. However, passing the Entry Level Exam, in itself, does not qualify an individual to install PV systems.	
NORTH CAROLINA Huntersville **Everblue** 8936 Northpointe Executive Park Dr., Suite 140 Huntersville, NC 28078 **PV Contact:** Ryan Bennett **Email:** rbennett@everblue.edu **Tele.** (704) 997-0057 **SH Contact:** Vince DiFrancesco **Email:** vdifrancesco@everblue.edu **Tele.** (704) 340-4095 **www.everblue.edu** **ONLINE Option**	**Solar PV Associate** This 40-hour program includes the basics of the PV market, PV system components, electrical basics, safety, PV system sizing considerations, PV siting, and performance analysis/troubleshooting. The course includes hands-on training with a solar kit.	**Solar Thermal Associate** **This 40 hour course examines the fundamentals of solar thermal technology with primary focus on heating domestic water. Students will learn how to conduct a site evaluation, identify solar thermal components, properly install and maintain a system, as well as how to model system performance. After completing the solar thermal boot camp, students will have acquired the foundation of knowledge needed to work in the field as well as advance to the installer level certification course.**
NORTH CAROLINA - Pittsboro **Central Carolina Community College** 764 West Street Pittsboro, NC 27312 **Contact/Instructor(s)**: David DelVecchio, Laura Lauffer **Email:** solarseed.david@gmail.com , llauffer@cccc.edu **Tele.** (919) 542-6495 Ext. 228 **www.cccc.edu**	**Introduction to Photovoltaic Systems – Training in Active Solar Power for your Home & Business:** Successful completion of this course will prepare one to describe and explain the properties and uses of photovoltaic systems and components. Recognize and use various components necessary for completion of a PV system. Perform site assessments for the proper installation of a PV system. Possess basic knowledge of PV systems, suitable for a supervised, entry level position with a dealer/installer or other PV industry company.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
NORTH CAROLINA - Raleigh **NC Clean Energy Technology Center** North Carolina State University Campus Box 7409 Raleigh, NC 27695 ***IREC's 2014 Training Provider of the Year!*** **Contact:** Maria O'Farrell **Email**: maria_ofarrell@ncsu.edu **Tele.** (919) 538-8888 **ONLINE Option** www.nccleantech.ncsu.edu ***IREC's 2014 Training Provider of the Year!***	**REPV: Renewable Energy Technology with Photovoltaic Systems:** This course is one of eight courses housed under the award-winning Renewable Energy Technologies Diploma Series. In addition, REPV is an IREC ISPQ accredited entry level PV course offering the NABCEP Entry Level Exam and is based on NABCEP's Job Task Analysis for PV installers. The classroom lectures of the REPV workshop are dedicated to the technical aspect of photovoltaics, including system types, components, applications, design and best practices for installation, maintenance, and troubleshooting. A hands-on day installing a fully integrated grid-tied PV system pulls together the classroom knowledge and rounds out the five-day workshop. REPV(A):Advanced Design and Installation of PV systems: This course is one of eight courses housed under the award-winning Renewable Energy Technologies Diploma Series. This week-long advanced photovoltaics class covers advanced topics on design and installation of residential and commercial PV systems. This advanced course delves into the details of electrical standards and codes. You must have taken an entry-level PV class to take this course. This course counts for the 40 hour advanced PV course education requirement found in SEC 3.5 of the NABCEP Candidate Handbook needed to sit for the NABCEP PV installer exam. The bulk of this week-long workshop covers topics relating to the National Electrical Code® (NEC) requirements for PV systems and prepares the participant	**REST: Renewable Energy Generation with Solar Thermal Systems:** This course is one of eight courses housed under the award-winning Renewable Energy Technologies Diploma Series. This five-day workshop on Solar Thermal technology focuses on domestic solar hot water systems and will discuss the various applications of solar thermal technology. You will learn how to site a system based on solar fundamentals and how to size a system based on thermal load analysis. You will explore system components, types, and designs as well as best practices regarding installation, maintenance and troubleshooting. A hands-on installation of both a fully-operational drainback and a pressurized glycol system will cap the week. In addition, REST is an IREC accredited entry level Solar Heating course offering the NABCEP SH Entry Level Exam and is based on NABCEP's Job Task Analysis for Solar Heating Installers.

FACILITY/INSTITUTION	PV COURSES	SH COURSES
	for proper code compliance, wire sizing, equipment specifications, permit processing, commissioning and other necessary steps in the design and installation phases of residential and commercial systems. Activities in this workshop include designing a multiple inverter commercial PV system, from choosing equipment to processing forms, and a tour of commercial PV systems.	
NORTH CAROLINA - Roxboro **Piedmont Community College** PO Box 1197 Roxboro, NC 27573 **Contact:** James "Mac" McCormick **Email**: mccormj@piedmontcc.edu **Tele.** (336) 599-1181 ext. 319 www.piedmontcc.edu	**Sustainability Technology Certificate** This certificate stems from our current Electrical Power Production, Industrial Systems, and Electrical/Electronics Technology programs. Students in these three programs of study would need only 3 core courses to take prior to taking the NABCEP PV Entry Level Exam.	
NORTH CAROLINA - Supply **Brunswick Community College** Continuing Education Department P.O. Box 30 Supply, NC, 28462 **Contact:** Marilyn Graham, Coordinator, Green Information Training Center **Email**: grahamm@brunswickcc.edu **Tele.** (910) 755-8561 www.brunswickcc.edu	**Solar Installer Certificate (From Brunswick CC)** This is a continuing education program designed to prepare students to understand the installation, function and repair of solar PV and solar thermal systems; to train students to safely install equipment using a combination of lecture, demonstration, discussion and hands-on lab work; and guide students to plan for job placement. The Solar Installer certificate includes: employment readiness, OSHA, basic building skills in carpentry, electricity and plumbing, and two separate solar modules: Solar Photovoltaic and Solar Thermal. This program prepares the student for the NABCEP PV Entry Level Exam.	**Solar Installer Certificate (From Brunswick CC)** This is a continuing education program designed to prepare students to understand the installation, function and repair of solar PV and solar thermal systems; to train students to safely install equipment using a combination of lecture, demonstration, discussion and hands-on lab work; and guide students to plan for job placement. The Solar Installer certificate includes: employment readiness, OSHA, basic building skills in carpentry, electricity and plumbing, and two separate solar modules: Solar Photovoltaic and Solar Thermal. This program prepares the student for the NABCEP PV Entry Level Exam.
NORTH CAROLINA Wilmington	**ALT 220 – Photovoltaic System Tech.** This course introduces the concepts,	**ALT 250 Thermal Systems** This course introduces concepts,

FACILITY/INSTITUTION	PV COURSES	SH COURSES
Cape Fear Community College North Campus 4500 Blue Clay Road Castle Hayne, NC 28429 **Contact**: Wesley Gubitz **Email:** wgubitz@cfcc.edu **Tele.** (910) 362-7528 or 7147 www.cfcc.edu	tools, techniques and materials needed to understand systems that convert solar energy into electricity with photovoltaic technologies. Upon completion, students should be able to demonstrate an understanding of the principles of PV technology and current applications. Traditional class room lectures combined with hands-on lab. 2 class hours/week, 3 lab hours/week for 16 weeks: 80 hours total.	tools, techniques, and materials used to convert thermal energy into a viable, renewable energy resource. Topics include forced convection, heat flow and exchange, radiation, the various elements of thermal system design, regulations, and system installation and maintenance. Upon completion, students should be able to demonstrate an understanding of solar thermal systems and corresponding regulations.
OHIO – Dayton **Sinclair Community College** Architecture Technology 444 West Third Street Dayton, OH 45402 **Contact:** Robert Gilbert, Professor of Architecture and Technical Director **Email**: robert.gilbert@sinclair.edu **Tele.** (937) 512-2317 www.sinclair.edu	**Solar Photovoltaic design and Installation:** (40 contact hours/3 quarter hour credits) This program is a combination of classroom and laboratory experiences and covers the ten major categories and learning objectives of the NABCEP Entry Level Program to prepare the student to take the NABCEP Entry Level Exam. Safety basics are included in a separate, prerequisite, 10 hour, 1 quarter hour credit, OSHA course. Students learn the use of equipment such as a Solar Pathfinder and software, pyranometer, multimeter etc. and other software such PV WATTS and manufacture specific inverter sizing software. ARTICLE 250, Grounding and Bonding, and ARTICLE 690, Solar Photovoltaic Systems, of the *NEC* are covered in detail.	
OHIO – Elyria **Lorain County Community College** 1005 N Abbe Road PC 209 Elyria, OH 44035 **Contact:** Ramona Anand **Email**: ranand@lorainccc.edu **Tele. (**440) 366-4930 lorainccc.edu/	**ALET 223 - PHOTOVOLTAIC SYSTEMS** This course explores the design, installation and use of Solar-Photovoltaic power systems for consumer and commercial applications. The course covers theory and hands-on lab experience required to assess, install, maintain, and troubleshoot solar-photovoltaic electrical generating systems.	

FACILITY/INSTITUTION	PV COURSES	SH COURSES
OHIO – Newark **C-Tec Adult Ed. Center** 150 Price Road Newark, OH 43055 Tina Trombley (740) 364-2254 TTrombley@c-tec.edu www.c-tec.edu/AE	**Introduction to Photovoltaics Solar Design & Installation** Introduction to Solar Photovoltaic Design and Installation is a combination of classroom and laboratory experiences and covers the ten major categories and learning objectives of the NABCEP Entry Level Program to prepare the student to take the NABCEP Entry Level Exam. Students learn the use of equipment such as a Solar Pathfinder and software, pyranometer, multi-meter etc. and other software such PV WATTS and manufacture specific inverter sizing software. ARTICLE 250, Grounding and Bonding, and ARTICLE 690, Solar Photovoltaic Systems, of the NEC are covered in detail.	
OHIO – Toledo **Owens Community College** Tracy Road P.O. Box 10,000 Toledo, OH 43699-1947 **Contact/Instructor(s)**: Joe Peschel, John Witte **Email:** joseph_peschel@owens.edu **Tele.** (567) 661-7163 **www.owens.edu**	**Photovoltaic Principles and Applications Training Program:** This 5 day training program for PV installers/integrators includes classroom and hands-on workshop. The course covers the basics in electricity, the characteristics of PV systems and theory and includes system sizing and construction, codes and standards, siting and design, battery safety, interconnection safety, troubleshooting, and maintenance. The workshop will include the design and installation of a grid-tied PV system. Installation practices of project management, adapting mechanical and electrical design, and system commissioning will also be discussed. Various inverters, PV modules, batteries and data information systems will be installed and operated.	
OHIO – Wooster **The Ohio State University ATI** 1328 Dover Road Wooster, OH 44691	**Renewable Energy Program** The Renewable Energy Program's Solar and Wind specialization at The Ohio State ATI focuses on the production of energy production from solar panels, wind turbines, and other renewable energy technologies.	

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Contact: Zhiwu (Drew) Wang **Email:** wang.3997@osu.edu **Tele.** (330) 287-1268 greenenergy.osu.edu/	The two-year Associate of Science Degree program provides coursework in chemistry, biology and physics as well as six courses specific to solar and wind energy production. The Associate of Science degree allows students to complete approximately 50 percent of the requirements for a Bachelor of Science degree in agriculture at The Ohio State University.	
OREGON - Eugene **Lane Community College** Science/Energy Programs 4000 East 30th Avenue Eugene, OR 97405 **Contact/Instructor(s):** Roger Ebbage, Ryan Mayfield **Email:** ryan_mayfield@earthlink.net **Tele.** (541) 463-3977	**Photovoltaic Design & Installation, I, II and III** Students may take the NABCEP Entry Level exam after taking ***any one*** of the three classes. This is a progressive series of courses over three terms. The first class starts with PV basics and electrical basics. The courses cover grid-tie and battery based systems (design and installation), NEC, job site safety, component specification, and system finances. Course structure is traditional classroom with labs, field trips and on-site installation. **Prep for the NABCEP Solar PV Entry Level Exam:** This course is designed for individuals who have a working knowledge of general electrical concepts and photovoltaics. This intensive two-day class is structured to prepare participants to take the NABCEP Entry Level exam. This Exam allows individuals to meet of the technical requirements of the Oregon Department of Energy's Tax Credit Certified Technician (TCCT) program. Those seeking TCCT status will need to attend an additional state-sponsored training on specific program requirements. The NABCEP Entry Level Exam will be granted to those who successfully participate in the course and pass the two-hour, 70-question exam that will be administered at the end of the course. Due to the fast paced nature of the	**Solar Water heating Tech Training** **A four day training which will include classroom instruction, and some hands-on experience with solar water heating system components, system design, and site analysis, as well as job safety and system maintenance. This course is designed as a complete introduction to solar water heating, covering all the NABCEP Solar Heating Entry Level Learning Objectives, plus best practices, local code and program requirements.**

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	course, the registration is limited to 30 students.	
OREGON – Tangent **Central Electrical JATC** 33309 Hwy 99E Tangent, OR 97389 **Contact/Instructor**: Greg Creal **Email:** greg@ibew280.org **Tele.** (541) 917-6199 www.cjatc.org	**Photovoltaic Systems:** The course is a combination of classroom instruction and hands-on lab work. The course will be presented as part of a 5 year apprenticeship program, and to licensed journeyman electricians. The text "Photovoltaic Systems" by Jim Dunlop will be used.	
PENNSYLVANIA - Bethlehem **Northampton Community College** Department of Business and Technology 3835 Green Pont Road Bethlehem, PA 18020 **Contact:** Craig Edwards **Email:** cedwards@northampton.edu **Tele.** (610) 332-6134 www.northampton.edu	This is an introductory course in the study of Solar Photovoltaic (PV) systems and components including system design and sizing for single residences, multifamily residences and light commercial applications; National Electrical Code rules for solar installations; related OSHA regulations; solar electric products and applications; energy conversion from sunlight to electricity; and operation of solar conversion equipment. After completing this course, students are eligible to take the NABCEP PV Entry Level exam.	
PENNSYLVANIA – Harleysville **Associated Builders & Contractors South Eastern Pennsylvania Chpt.** 1500 Gehman Road Harleysville, PA 19438 **Contact:** William Henry, Director of Craft Training **Email:** bhenry@abcsepa.org **Tele.** (215) 256-7976 **www.hacc.edu**	**Introduction to Solar Installation** – 45 hour course This course covers the basic fundamentals in the design, installation and assessment of solar photovoltaic (PV) systems for use in residential and commercial applications. The course includes the use of industry standard tools and techniques used in the installation of photovoltaic systems – the modules, inverters and system components to make a complete installation. Attendees will learn system design, sizing and requirements for the proper installation of the system.	
PENNSYLVANIA - Harrisburg **Harrisburg Area Community College** Midtown 1-207, One HACC Dr.	**Solar Photovoltaic (PV) Electric Systems** Learn the fundamentals of PV system design and installation in one of either a 40- or 60-hour workshop	**Entry Level Solar Heating** This class is designed to provide the participant with a working knowledge of what solar thermal generation

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Harrisburg, PA 17110 **Contact:** Cheryl Deitz **Email:** chdeitz@hacc.edu **Tele.** (717) 221-1338 **Fax:** (717) 909-4014 **www.hacc.edu**	designed for those interested in the expanding PV industry. In the Energy Training Center, you will gain a technical foundation in stand-alone and grid-tied code-compliant solar electric systems. The content follow NABCEP's learning objectives for the entry level exam. Other classes of interest for Entry Level students: Streamlining Solar NEC, electrical grounding and Bonding PV Field Inspector Will Solar Work for Me Selling Solar Also conducting a PV Installer Prep for the NABCEP exam and a PV Sales Prep for the NABCEP exam. Contact Cheryl Deitz for times, dates, locations and costs.	technology is and how it works. Solar thermal systems can provide domestic hot water and/or pool heating. Training begins with the fundamentals of solar hot water, defining the solar thermal market, understanding the solar resource and performing site assessments. Solar basics like sun path, angle of incidence, and heat transfer topics follow next. Different systems types will then be reviewed and examined in lab, such as Active, Passive, Direct, Indirect, Pressurized, Drainback, Swimming pool systems, Flat Plate, Evacuated tube and other collectors. Mounting considerations will be reviewed in the lab and with sample system photos. This includes electrical and plumbing connections. System sizing will be reviewed for all climates in N. America. Computer models will be used in lab for the sizing, generation, and economics of the system. Commissioning and troubleshooting topics will conclude the course in preparation for the NABCEP solar Heating Entry Level Exam.
PENNSYLVANIA – Media **Delaware County Community College** 901 S Media Line Rd Media, PA 19063 Contact: Karen Kozachyn Email: kkozachyn@dccc.edu Tele. (610) 359-5362 **www.dccc.edu**	**Solar PV System Design and Installation** This International Renewable Energy Council (IREC) accredited course is designed to introduce students to grid tied photovoltaic (PV) systems. In this course students will learn the benefits of a grid tied system and the positive impact on the environment these systems can have. At the conclusion of this course students will have the basic knowledge and understanding in design and installation of residential and commercial buildings. This course is patterned after the Job Task Analysis set by the NABCEP Entry-Level Solar PV exam and also fulfills the prerequisite of related experience and education required sit for the industry certification. The certification is not included in the	

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	course. Upon successful completion of this course, students will be able to: • Verify System Design and determine the requirements for a photovoltaic system • Manage the Project. • Site the requirements to interconnect a photovoltaic system to the power grid. • Properly apply article 690 of the National Electric Code (NEC) • Install Electrical Components. • Install Mechanical Components. • Properly determine the financial benefits of a photovoltaic system • Complete System Installation. Properly size and install a photovoltaic system for a residential and commercial building. • Determine environmental factors that can interfere with a working photovoltaic system • Conduct Maintenance and Troubleshooting Activities.	
PENNSYLVANIA - Philadelphia **Apprentice Training for the Electrical Industry Local 98 IBEW** 1719 Spring Garden St. Philadelphia, PA 19130 **Contact:** Michael Neill **Email:** mneill@ibew98.org **Tele.** (215) 567-6405 www.IBEW98.org	**Course description pending**	
PENNSYLVANIA – Phoenixville **Chester County Intermediate Unit (CCIU)** 1580 Charlestown Road Phoenixville, PA 19460 **Contact:** Andrew Jacobs, Sustainable Energy Engineering Instructor	**Sustainable Energy Engineering** This 3-year, PA Dept. of Education approved career and technical education daytime program is for grades 10-12 and adults with an additional 9th grade career exploratory option year. The program offers OSHA 10 training and preparation for the electrician's	

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Email: drewj@cciu.org **Tele.** (610) 933-8877 x.4101 www.cciu.org	licensure exam. First year concentration is basic electrical theory and practical application with Solar PV Entry Level training. A separate 40 hour adult evening course is also offered at this site for Solar PV Entry Level and OSHA 10 training.	
PUERTO RICO - Aguadilla **University of Puerto Rico - Aguadilla** Building 251, Belt Road Aguadilla, P.R. 00604-6150 **Contact/Instructor(s):** Prof. Ana E. Cuebas Director, Educational Continuing Division **Email:** ana.cuebas@gmail.com **Tele.** (787) 890-7118, 890-2681, Ext. 264/275/269	**Introduction to Photovoltaic Solar Energy Systems:** This 45 hour course will provide the students knowledge and tools for the application of the basic concepts involved in the operation and installation of photovoltaic solar energy systems, with or without connection to the electric wire system of Puerto Rico. The participant will be able to install a complete PV system with or without batteries in the solar classroom laboratory. Regulations from the Puerto Rico Electrical Power Authority and state laws regulating the renewable energy area will be covered in the course.	
PUERTO RICO – Garrochales **Arecibo Job Corps** PO Box 544 Garrochales, Puerto Rico 00652 Jose Roldan 1-787-816-5539 Rolden.Jose@jobcorps.org www.arecibo.jobcorps.gov	**ADV. SOLAR (PV) AND THERMAL SYSTEM INSTALLER** The Job Corps Adv. Solar(PV) and Thermal System Installer career technical training program requires advanced training in the following subject areas: Solar energy and system fundamentals, electricity and energy basics, site assessments, installing solar-thermal mounting, collectors, water heaters, storage tanks, piping and other components, PV system electrical design, installing solar PV panels, arrays, and subsystems, performing PV and thermal system check-out procedures and inspections, maintaining and troubleshooting PV and thermal systems, proper sizing and siting of various systems, materials cost estimates and working safety.	

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RHODE ISLAND - Warwick **New England Institute of Technology** Department of Electrical Technology 2500 Post Road Warwick, RI, 02886 **Contact:** Thomas Thibodeau, Assistant Provost **Email:** tthibodeau@neit.edu **Tele.** (401) 739-5000 www.neit.edu	**ELY 280 Photovoltaic Systems** will focus on the design, selection and installation of solar photovoltaic systems for residential, commercial, and industrial systems. Topics include: introduction to photovoltaics; site surveys and planning; system components and configurations, cells, modules, and arrays; stand-alone systems and grid-tied systems with or without battery storage capability; inverters, system sizing and system integration; permitting and inspection; commissioning, maintenance and troubleshooting; and economic analysis. A parallel discussion within the topic areas will be an in-depth exploration of the mathematical equations and the NEC requirements to ensure that the photovoltaic system design and installation is appropriate for its intended use and will meet all NEC Article 690 code requirements. Students will be required to prepare a quarter long research project that will analyze NEIT's PV Array output. This project will track energy production, weather conditions, net metering analysis and economic analysis.	
SOUTH CAROLINA - Greenville **Greenville Technical College** 216 Pleasantburg Drive Mail Stop 5011 Greenville, SC 29607 **Contact:** Joy N. Finch **Email:** joy.finch@gvltec.edu **Tele.** (864) 250-8155 **www.gvltec.edu/ccd**	**SOL 201 Solar Photovoltaic Systems (Equivalent CE Course Code: ROG651)** This course studies the installation and connections of solar photovoltaic (PV) components in residential or light commercial field applications. Students will be required to perform code compliant installations in field simulated conditions and will design and install two complete solar PV systems during the lab portion of this class. Some strenuous activities will be required to complete this course. Students must have the ability to lift 50 pounds and work above ground level to install solar	

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	systems. Prerequisite: SOL 120 or equivalent.	
TENNESSEE - Brentwood **Nashville State Community College** **The Sage Group** 5300 Maryland Way Suite 103 Brentwood, TN 37027 **Contact:** Sandy Wilson **Email:** swilson@thesagegrp.com **Tele.** (937)748-2532 **www.thesagegrp.com**	**Introduction to Photovoltaic Systems:** This introduction level course is designed for participants who want to gain knowledge and skills related to the design, installation and evaluation of photovoltaic (PV) systems. Topics covered in the course include solar PV systems, PV system design and PV system components with hands-on lab for knowledge and skill application.	
TENNESSEE - Chattanooga **Chattanooga State Community College** 4501 Amnicola Highway Chattanooga, TN 37406 **Contact:** William Wan **Email:** william.wan@chattanoogastate.edu **Tele.** 423-697-4726 **www.chattanoogastate.edu/**	**Solar Energy Technology** As the nation and the world look for new sources of energy, electricity generated from renewable resources is one of the fastest growing segments in the electrical power industry. Students study the design of solar systems, components, equipment subsystems, and installations. Emphasis is placed on safety, basic installations, and connecting a Photovoltaic system to the electrical grid. Commercial and Residential installation technician, energy audit technician, and Photovoltaic systems technician are a few of the career options available to graduates.	
TENNESSEE - Cleveland **Cleveland State Community College** 3535 Adkisson Drive NW PO Box 3570 T101A Cleveland, TN. 37320 **Contact/Instructor(s):** Allan Gentry **Email:** AGentry@clevelandstatecc.edu **Tele.** (423) 473-2447	**PV Panel Installation (CST 2050):** Basic details of sizing a PV installation to meet site and energy needs. Techniques of rooftop, pole, etc. mounting to meet weather, grounding and disconnecting needs. Electronics for battery bank and/or utility grid tie. NEC Code 690 for utility tie. Open circuit voltage and closed circuit current measurements. Traditional community college classroom with lab.	

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TENNESSEE - Dickson **Tennessee College of Applied Technology Dickson** 740 Highway 46 Dickson, TN 37055 **Contact:** Mark Powers, Director **Email:** mark.powers@ttcdickson.edu **Tele.** (615) 441-6220 **www.ttcdickson.edu**	**Course description pending**	
TENNESSEE - Knoxville **University of Tennessee Center for Industrial Services** 105 Student Services Building Knoxville, TN 37996 **Contact:** Earl Pomeroy, Instructor **Email:** earl.pomeroy@tennessee.edu **Tele.** (615) 532-3328 www.cis.tennessee.edu/	**Course description pending**	
TENNESSEE - McKenzie **Tennessee College of Applied Technology, McKenzie** Electronics and Green Technology 16940 Highland Drive McKenzie, TN 38201 **Contact:** Bruce Moore, Instructor **Email:** bruce.moore@ttcmckenzie.edu **Tele.** (731) 352-5364 **www.tcatmckenzie.edu**	**Course description pending**	
TENNESSE - Pulaski **Tennessee College of Applied Technology, Pulaski** 1233 East College Street PO Box 614 Pulaski, TN 38478	The Solar training program's mission concentrates on the basics of understanding and installing code compliant solar energy systems. This program is beneficial to people who currently work in or want to be employed in the green renewable energy industry. Student technicians will learn the	

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Contact: James Dixon, Director **Email:** james.dixon@ttcpulaski.edu **Tele.** (931) 424-4014 www.tcatpulaski.edu/ Awards: Certificate & Diploma Program Length: 3 Trimesters	practical theory, design criteria, installation guidelines, safety issues, and maintenance principles of photovoltaic solar systems. The program's curriculum covers: * Understanding Solar Energy * Safety Basics * Basic Mathematics and CRC * Electrical Basics * Photovoltaic Systems I * Photovoltaic Systems II * Installation Techniques & Guidelines * Financial Basics & Job Documentation * Performance Analysis/Troubleshooting	
TEXAS - Austin **Austin Community College** 5930 Middle Fiskville Road Austin, TX 78752 **Contact/Instructor(s)**: Michael Kuhn, John Hoffner **Emails:** Michael.kuhn@imaginesolar.com John.Hoffner@imaginesolar.com **Tele.** (512) 223-7662 (Robert McGoldrick at ACC)	**HART 1071** Solar Electric Systems, Entry-Level. This is in alignment with the NABCEP Entry-Level Exam task analysis and prepares people to go to work for solar installers. It is 42 contact hours and is offered through the ACC Continuing Education department. This is our original course and we have offered it every semester since Spring of 2006. **HART 1072** Advanced Solar Photovoltaic Installer. This is an advanced course (48 contact hours) in alignment with the NABCEP Professional-Level task analysis and prepares installers to take the NABCEP professional-level solar installer exam once they have the experience requirements as stated by NABCEP. This course is offered through the ACC Continuing Education department. We offered this course for the first time in Spring of 2008. **ELMT 2474** Solar Photovoltaic Systems. This is an intermediate level (96 contact hours) and is in alignment with the NABCEP Entry-Level Exam task analysis and prepares people to go to work for solar installers. This is a for-credit course offered through the Electronics and Advanced	

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	Technologies department. It is a requirement for our new 2-year associates degree in renewable energy. We offered this course for the first time in Spring of 2008. *Each of the above three courses are approved by NABCEP as satisfying the training pre-requisite for sitting for the Entry-Level exam.* *Each course also qualifies as a NABCEP-approved training program for reducing the experience requirement for the professional-level solar installer exam. All three courses are college-level full-semester courses.*	
TEXAS - Austin **Imagine Solar** 4000 Caven Road, Austin, TX 78744 **Contact:** Alicia Cloud **Email:** info@imaginesolar.com; alisha.cloud@imaginesolar.com **Tele. (**888) 514-1972 www.imaginesolar.com	**PV100 Series: Photovoltaic System Design & Installation** (Formerly named PV201) This series of workshops meets the requirements to sit for the NABCEP PV Entry Level Exam and follows the ISPQ standards. Our expanded 48-hour PV100 Series supersedes our 40-hour PV201. The PV100 Series also includes hands-on labs including a utility-interactive installation and an off-grid installation. Our customers have always appreciated the hands-on components of our training so we include it in our entry-level training. The PV100 Series can be taken as three separate courses: PV150: Grid-Tied PV System Installation PV160: Grid-Tied PV System Design PV170: Off-Grid PV System Design and Installation: The complete series is required for the NABCEP PV Entry Level Exam. Therefore, upon completion of these courses, you can sit and take the NABCEP Entry Level PV Exam at a Computer Based Center authorized by NABCEP. Our workshop assumes no previous experience. It is appropriate for the serious non-technical beginner as	

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	well as electrical contractors, electricians, engineers, and entrepreneurs. Training modules include the following: The Photovoltaic Industry and the Qualified Solar Pro; Basics of Electricity; The Solar Resource; Site Assessments; Tools for the Solar Professional; System Components and Configurations; Cells, Modules, and Arrays: Specifications, Technologies, Vendor Comparisons; Batteries and Charge Controllers; Inverters: Types and Specifications; System Sizing and Design; Mechanical Integration; Electrical Integration: National Electric Code, Voltage Drop; Utility Interconnection; System Installation and Commissioning; Performance and Troubleshooting. Attendees of the complete PV100 Series will be provided the textbook titled Photovoltaic Systems by Jim Dunlop from American Technical Publishers as well as the ImagineSolar custom course materials. As an alternative, you may take our online course PV201e: PV System Design & Installation. Our online course covers the NABCEP PV Entry Level Learning Objectives but does not include hands-on labs. For the hands-on labs and the utility-interactive installation you can take PV201eLab. You will be provided the textbook titled Photovoltaic Systems by Jim Dunlop from American Technical Publishers for our online course PV201e.	
TEXAS - Del Valle **SolPowerPeople, Inc.** 5035 Hwy 71 E Del Valle, TX 78617 **Contact**: Richard D. Stovall, CEO **Email:** info@solpowerpeople.com	**SPV 2000/SPV3000 Accelerated PV Design & Installation Workshop:** The SPV2000/SPV3000 Accelerated PV Design & Installation Workshop implement a blended course model carefully designed to provide a solid foundation of knowledge coupled with advanced applied learning	

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Tele. (855) 765-7693 www.solpowerpeople.com	activities in a comprehensive conceptual and experiential learning format. This training intensive is designed for individuals seeking careers in the solar energy industry or who are interested in understanding what they need to be able to do to add solar PV related series to their existing home and./or business.	
TEXAS - El Paso **El Paso Community College** 919 Hunter El Paso, TX 79915 **Contact**: Olga L. Valerio **Email:** ovalerio@epcc.edu **Tele.** (915) 831- 2350 epcc.edu/ContinuingEd/ATC/	The programs in Renewable Energy offered at Advanced Technology Center are an Associate's Degree in Applied Science and a one-year Certificate of Completion. The primary focus is on Photovoltaic (PV) Systems and Solar Thermal Systems because there is significant regional potential for solar energy development, but also includes an overview of other renewable energy sources. It prepares the student for entry-level positions in the field of PV and Solar Thermal installation and maintenance.	
TEXAS - El Paso **Kaplan College** 8360 Burnham Road El Paso, TX 79907 **Contact: Luis Tovar** **lutovar@cct-ep.com** **915/595-1935** **ONLINE!**	20 hours of self-paced online solar energy training or 40 hours of live classroom and hands-on solar installation training.	
TEXAS - Grand Prairie **North Texas Electrical JATC** 680 W. Tarrant RD Grand Prairie, TX 75050 **Contact**: Kim L. Allen, Training Director **Emails:** kallen@ntejatc.org **Tele.** (972) 266-8383 ex. 102	This PV Entry Level Course covers the fundamentals, design and installation of Solar Photovoltaic (PV) Systems. It will include actual hands-on work with photovoltaic systems and equipment along with class you lectures. It is targeted towards Electrical Contractors, Journeyman, Instructors and Apprentices wanting to learn more about the installation and technology of PV systems.	

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	Upon completion of the course, students will sit for their NABCEP Entry Level Exam. Students passing the Entry Level Exam will receive a document stating that they have passed the NABCEP PV Entry Level Exam. No experience in PV systems is required; however a good understanding of basic electrical principles is required to complete the course.	
UTAH - Cedar City **Southwest Applied Technology College** 500 W. 800 S. Cedar City, UT 84720 **Contact**: Mark Florence **Email:** mflorence@swatc.edu **Tele.** (435) 586-2899 www.swatc.edu/RenewableEnergy	**Solar Fundamentals** Solar Fundamentals I - This 60 hour course explores the basic principles of utility-interactive and stand-alone photovoltaic systems. Solar Fundamentals II - This 60 hour course covers the requirements of the National Electrical Code (NEC) in relation to utility-interactive and stand-alone photovoltaic systems. Training in each course consists of hands-on labs and a blend of classroom and/or online instruction. Upon completion of both courses, students will have covered the NABCEP PV Entry Level Learning Objectives and will be prepared to take the NABCEP Entry Level Exam.	
UTAH - Kaysville **Davis Applied Technology College** 550 E 300 South Kaysville, UT 84037 **Contact**: Stacy Hatch **Email:** stacy.hatch@datc.edu **Tele.** (801) 593-2433 www.datc.edu	**Course description pending**	

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UTAH – Ogden **Weber State University** 1447 Edvalson St. Dpt 1802 Ogden, UT 84408 Fred Chiou (801) 626-6470 fredchiou@weber.edu www.weber.edu	**Solar PV Systems** The goal of the 50-hour course is to provide the fundamental knowledge and technology of the basic solar photovoltaic (PV) system with system design and applications. The topics in this course includes PV markets and applications, electricity basics, safety basics, the fundamentals of solar PV energy, PV system components, grid-tied and battery-based systems, load analysis and PV system sizing, PV system electrical and mechanical designs, National Electric Code (NEC) applied to PV systems, commissioning and decommissioning, performance analysis, maintenance and troubleshooting. The course includes lecture and labs**.**	
UTAH - Salt Lake City **Salt Lake Community College** 4600 South Redwood Road Salt Lake City, Utah 84123 **Contact Course Coordinator**: Judy Fisher **Email:** judy.fisher@slcc.edu **Tele.** (801) 957-5252	**Basic PV Installation** CEAE 0200 This 45 hour course introduces students to the basic principles of utility interactive photovoltaic system design. Through classroom instruction and Solar Training Yard hands-on lab activities, the course will provide the knowledge to conduct site evaluations, prepare a basic electrical and mechanical design and select appropriate components such as: PV modules, inverters, racking, wire types, wire sizes and overcurrent protection, all in accordance with the local municipality and the 2011 NEC code. Students who successfully complete this class could seek a supervised, entry level position with a dealer/installer or other photovoltaic industry company. In addition, students meet the education requirement and receive solid preparation to take NABCEP's PV Technical Sales Certification exam (along with other NABCEP required field experience.)* Achieving a passing score demonstrates basic knowledge of design, installation and application of photovoltaic systems.	

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	Potential employers may use this as a benchmark to assess candidates. The same textbook is used for both the Basic Photovoltaic Systems and the Advanced Photovoltaic Systems courses. It is available at the Taylorsville-Redwood Campus bookstore. The National Electrical Code Handbook is required for the Advanced course. *For more information, please visit NABCEP's web site, www.nabcep.org. Check the Utah Division of Occupational and Professional Licensing (DOPL) web site, www.dopl.utah.gov, for current licensing rules and regulations. Course meets 6 hours core and 11 hours professional DOPL requirements. Pre-Requisites: CEAE 0100 or Instructor Approval	
VERMONT - Randolph Center **Vermont Technical College** 1 Main Street Randolph Center, VT 05061 **Contact**: Mia Roethlein **Email:** mroethlein@vtc.vsc.edu **Tele.** (802) 477-3783 **www.vtc.edu**	**Introduction to PV Technology** The course targets the learning objectives for the NABCEP Entry Level exam. The text used is "Photovoltaic Systems" by J. Dunlop and it includes a hands-on component including activities with small panels and components as well as installation of a 1.8kw array (grid-tied). The course targets electricians' apprentices and others.	
VIRGIN ISLANDS (U.S.) **ST. THOMAS** **University of the Virgin Islands** 2 Brewer Bay St. Thomas, VI (U.S.) 08022 **Contact:** Wayne Archibald, Director **Tel: (340) 693-1158** **warchib@live.uvi.edu** **cgtc.uvi.edu**	**Caribbean Green Technology Center Workforce Development Program** This 40-hour workshop will introduce participants to the basic concepts, tools, techniques and materials needed to design and construct both battery-based and grid-direct photovoltaic systems. The course will focus on the key competencies addressed in the NABCEP Entry level PV exam. Upon passing, you will receive the NABCEP Entry Level Achievement Award. The NABCEP PV Entry Level Program is designed for individuals wanting to get into the solar field,	

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	and is a way to demonstrate achievement of a basic knowledge of the fundamental principles of the application, design, installation and operation of grid-tied and stand-alone PV Systems.	
VIRGINIA - Abingdon **Virginia Highlands Community College** 100 VHCC Drive Abingdon, VA 24210 **Contact**: Reva Russel **Email:** rrussell@vhcc.edu **Tele.** (276) 739-2475 **www.vhcc.edu**	**Energy Technology – AAS Degree 3 Course:** ENE 120 – Soalr Power Photovoltaic and Thermal 4 credits, 90 hours (45 lecture, 45 Lab) ENE 110 – Solar Power Installations – 4 Credits 90 Hours (45 lecture, 45 Lab). ELE 157 Electricity Fundamentals 7 Credits, 105 Hours (45 Lecture, 60 Lab)	
VIRGINIA – Richmond **Richmond Electricians' JATC** 11255 Air Park Road Ashland, VA 23005 William Leigers (804) 752-8266 bleigers@rjatc.org www.rjatc.org	**Photovoltaics Systems Class** This course will introduce students to photovoltaic design, installation, and maintenance of PV systems. The course will follow the Photovoltaic Systems textbook by James Dunlop. The classroom theory and hands-on training will cover the following learning objectives: PV Markets & Applications, Safety Basics, Electrical Basics, Solar Energy Fundamentals, PV Module Fundamentals, System Components, Sizing, PV System Electrical & Mechanical Design, and Performance Analysis, Maintenance and Troubleshooting, in addition to the applicable NEC requirements. At the end of the course students will have the opportunity to sit for the NABCEP PV Entry Level Exam.	
VIRGINIA- Chesapeake **Tidewater Electrical JATC** 828 Providence Road, Suite A Chesapeake, VA, 23325 **Contact:** Michael Iacobellis, Training Director	**Solar PV Systems & Installations -** The solar photovoltaic course offered by the Tidewater JATC is a 32 hour course taught over four weeks. This is an interactive course combining Hands on Training using Textbook & Computer based lessons in a classroom setting. The	

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Email: mikei@tidewaterjatc80.com **Tele.** (757) 480-2812 **www.jatc80.com**	Tidewater JATC uses the following study guides, American Technical Publishers "Photovoltaic Systems" and the NJATC "Photovoltaic Systems Workbook". The on-site PV system is used throughout the training sessions. Topics covered: • Solar Energy relativity to Earth • Measuring & recording solar data • Understanding and the use of solar tracking devices to determine site placement of a PV system. • How to properly plan and lay-out a photovoltaic system, with an in depth look at each of the major components in a PV system • Installations of a photovoltaic systems Upon completion of the course, students will sit for their NABCEP entry level exam. No experience in PV systems work is necessary; however an understanding of basic electrical principles is required to complete the class. Access to a computer is required for some of the lessons.	
VIRGINIA - Dublin **New River Community College** 5251 College Drive Dublin, VA 24084 **Contact/Instructor:** Keith McAllister **Email:** kmcallister@nr.edu **Tele:** (540) 674-3600	**ELE176 Introduction to Alternative Energy and ELE 177 Photovoltaic Energy Systems:** ELE176 Introduces Alternative Energy with an emphasis on Solar & Small wind Turbines technology, PV and Solar Thermal technology, solar applications, energy terminology, system components, site analysis, Solar system integration and system connections and small wind turbine site analysis. Lecture 2 hours, Lab 2 hours – 4hrs total/week. ELE177 – Site Surveys, installing system components, installing inverters and	

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	performing system sizing and system maintenance, different battery configurations, charge controllers, site safety, system design & layout, National Electric Code, component selection, wiring and installation technique. Lecture 3 hours, Lab 3 hours, 6 hours total/week (14 weeks).	
VIRGINIA - Richmond Sustainable Technology Institute Inc. 607 Wickham St. Richmond, VA 23222 **Contact**: Wilson Caton **Email:** wil@sustainabletechnologyinstitute **Tele.** (804) 938-7774 sustainabletechnologyinstitute		**Intro to Solar Thermal Heating** With excellent Federal tax incentives available, there is a current opportunity for future students to expand their businesses and careers into the field of solar installation. This 5 day workshop will provide students with in-depth training involving the installation of solar thermal heating systems. There will be both classroom training and hands-on lab activities throughout the duration of the class. Some topics of discussion will be: solar thermal water heating, solar thermal space heating, solar thermal panel technology, system troubleshooting, and safety and building code issues. Students will also be prepared to take the entry level NABCEP solar thermal heating exam at the end of the class. The time is now for renewable energy. Don't miss this opportunity to expand your career into a growing field.
VIRGINIA - Wytheville **Wytheville Community College** 1000 East Main Street Wytheville, VA 24382 **Contact/Instructor:** Angela G. Lawson **Email:** alawson@wcc.vccs.edu **Tele:** (276) 744-4973 www.wcc.vccs.edu	**ENE 120-Soalr Power Photovoltaic and Thermal:** Within the Construction Tech. Alternative Energy specialization Diploma, Wytheville Community College has developed a "Solar Installer" career studies certificate with a focus on PV and Thermal Solar Power Installations. Integrated into that "Solar Installer" career studies certificate program us a single course (ENE 120) with specific competencies and objectives that include but are not limited to the required NABCEP Entry Level Learning Objectives. ENE 120 is an approved part of the Virginia Community College Mater Course	

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	file. The course studies production and conversion of electrical energy from modular to grid power systems, storage of energy, PV and thermal solar capture, residential and commercial storage applications. There is a pre-requisite electrical course or equivalent experience requirement for ENE 120.	
WASHINGTON - Shoreline **Shoreline Community College** 16101 Greenwood Ave. North Science/Math Division Shoreline, WA 98133 **Contact:** Louise Petruzzella **Email:** lpetruzzella2@shoreline.edu **Tele.** (253) 396-8446 **www.shoreline.edu**	**Course description pending**	
WEST VIRGINIA - Parkersburg **West Virginia University at Parkersburg** 300 Campus Drive Parkersburg, WV 26104 **Contact**: Gary Thompson **Email:** gary.thompson@mail.wvu.edu **Tele.** (304) 424-8000 www.wvup.edu	**Solar Energy Technology – 1 Year Certificate** The Solar Energy Technology Certificate Program at WVUP will prepare students for employment designing and installing solar electric systems, as well as integrating solar technologies into existing electrical systems.	
WISCONSIN **NECA-IBEW Wisconsin JATCs** Local Unions 14, 127, 158, 159, 388, 430, 577, & 890 **Contact**: Clay Tschillard, Coordinator / Training Director **Email:** clay@wijatc.org **Tele.** (608) 221-3321 www.wijatc.org	This is a 45-hour comprehensive course covering the entire text of author Jim Dunlop's "Photovoltaic Systems". The curriculum used was developed by the NJATC in conjunction Jim Dunlop and combines a blend of classroom instruction and hands-on activity. Journeyman Electricians are instructed in all facets of PV installations, including solar theory, system design, safety, NEC Code, and troubleshooting. Due to the advanced nature of the course, it is limited to individuals possessing a	

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	journeyman electrician's certification, including a minimum of 10,000 hours of electrical construction experience. Upon successful completion of the NABCEP Entry Level Exam, participants will be awarded a Certificate of Completion by the NJATC.	
WISCONSIN - Custer **The Midwest Renewable Energy Association (MREA)** 7558 Deer Road Custer, WI 54423 **Contact**: Stephen Knudsen stephenk@midwestrenew.org 715-592-6595-106 www.midwestrenew.org **ONLINE Options**	**All three of courses are required and available through the MREA either online or in person.** **Basic PV (PV 101)** - Teaches the basics of solar electric systems including PV system types, system component identification, best application and limitations of each system type, defining the solar window, system loads, and energy efficiency recommendations. **PV Site Assessment Training (PV 201)** - Teaches how to perform a PV site assessment for a home or small business. Covers site assessment tools, load analysis, array placement options, basic system sizing, cost estimates, PV system performance calculators, and invectives. **PV System Design (PV 202)** - Participants use example site assessments, PV system component design examples, and PV system case studies to learn about selecting equipment, system sizing, layout planning, array siting, and other design considerations. All three training courses are available online or in person.	**ST 101 – Solar Domestic Hot Water** ***Or*** **STO 101 - Solar Domestic Hot Water Online** ***And*** **ST 301 – Solar Hot Water Installation Lab** Students will attend two separate workshops. Students must complete ST 101, either online or in person, and then attend a 3-day Solar Hot Water Installation Lab. Students will learn all aspects of site analysis, system design, installation, safety, code, and troubleshooting & maintenance. Total course length is 32 hours. Courses are a mixture of lecture and hands-on.
WISCONSIN - Green Bay **Northeast Wisconsin Technical College** 2740 W. Mason Street Green Bay, WI 54307 **Contact**: Amy L. Kox **Email:** amy.kox@nwtc.edu **Tele.** (920) 498-6908	**Energy-Intro to Solar Electricity** is an overview of the use of sunlight to produce electricity and the practical and economic use of PV power systems. Learn the importance of energy efficiency and the economics of PV-generator hybrid designs. (3 credits.) **PV-Design & Site Assessment** will teach the steps to performing a site audit prior to installation of a PV system. Focus on defining the solar window, system site placement and	

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www.nwtc.edu	sizing, lead analysis and energy efficiency. (2 credits) Northeast Wisconsin Technical College offers a *Renewable Energy Solar Certificate program.*	
WISCONSIN - Port Wing **Great Northern Solar – Education** 77480 Evergreen Rd. Ste.1 Port Wing , WI 54865 **Contact**: Christopher LaForge, ISPQ Certified Independent Master Trainer **Email:** gosolar@cheqnet.net **Tele. (**715) 774-3374	Great Northern Solar - Education Division offers three program paths covering the Entry Level Learning Objectives. They include: 1) Completion of our standard curriculum - Basic Photovoltaics, Intermediate Photovoltaics, and either Photovoltaic Hands-on Lab or an Advanced Photovoltaic Installation, 2) Independent study with GNS-ED covering the same EL learning objectives over a longer period, or 3) Completion of The GNS-ED Advanced Intensive Class-room and Hands-on Lab program (42 contact hours). No set prerequisites, candidates should have a strong understanding of electrical and Photovoltaic concepts.	