REGISTERED PROVIDERS FOR the NABCEP® ENTRY LEVEL PV EXAM

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

There are currently:
5,830 Students who have passed the NABCEP Entry Level Exam
246 Providers of the Entry Level Exam

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

FACILITY/INSTITUTION	COURSE NAME(S)
ARIZONA – Chandler **Chandler-Gilbert Community College** Center for Workforce Development 2626 Pecos Road Chandler, AZ 85225 **Contact:** Ruth Romano, Director of Workforce Development **E-mail:** ruth.romano@cgcmail.maricopa.edu **Tele.** (480) 732-7071 **www.cgc.edu**	**Photovoltaic System Installation Course** 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 **eRenewable Resource Institute, Inc.** 2158 N. Gilbert Road, Ste. 106 Mesa, AZ 85203 **Contact:** Mia Hillery, Senior Administrator **E-mail:** mia@erenewableresource.com **Tele.** (480) 446-0400 **www.erenewableresource.com**	**PV100 Solar Installation and Design** This ISPQ accredited class is presented for beginning or experienced audiences, and is an entry-level training that provides excellent preparation for a solar installation career. Focusing on a safety-first approach and designed with input from experienced solar installers, this course prepares the student for the jobsite by explaining concepts, practices, regulations, tools, and terms related to the industry. Students are introduced to concepts of basic electricity through solar power generation and grid-integrated systems, and have the opportunity to work with electricity lab kits, solar panels, and site evaluation equipment and software. This 40 hour course is formatted for in–person, hands-on instruction conducted by expert trainers.
ARIZONA – Phoenix **Gateway Community College** Industrial Technology Division 108 N 40th Street, Phoenix, AZ 85034 **Contact:** Dr. Clyde Perry, Division Chair	**AEN 2010 Spring – 9999** **Photovoltaics Design and Installation** Design, operation, installation and service of photovoltaics. 1. Describe the types of photovoltaics systems. 2. Explain electrical principles. 3. Calculate electrical values. 4. Determine the proper solar location. 5. Determine electrical loads. 6. Explain the electron theory for photovoltaic and

E-mail: clyde.perry@gwmail.maricopa.edu **Tele.** (602) 286-8615 **www.gatewaycc.edu**	performance factors. 7. Explain battery technology. 8. Calculate battery size for a given installation. 9. Define the types of controllers. 10. Select the proper controller for an application. 11. Explain the proper controllers for an application. 12. Calculate wiring systems for photovoltaic. 13. Determine proper sizing of PV systems. 14. Demonstrate installation of a solar system. 15. Demonstrate safe working habits.
ARIZONA – Phoenix **The Refrigeration School Inc.** 4201 East Washington Street Phoenix, AZ 85034 **Contact:** Sherry Jones, Executive Director **E-mail:** sherry.jones@rsiaz.edu **Tele.** (602) 267-4801 **www.refrigerationschool.com**	**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
ARIZONA – Phoenix **Phoenix College** Custom Training and Education 640 N. 1st Avenue Phoenix, AZ 85003 **Contact:** Roberta Jeffers, Director of Business & Industry Partnerships **E-mail:** r.jeffers@pcmail.maricopa.edu **Tele.** (602) 223-4053 **www.pc.maricopa.edu/pcdt**	**Photovoltaic (Solar Energy) Entry Level Program** This course is especially created to take a person with NO knowledge of electricity or solar component parts and get them to understanding the basics of electricity and understanding how the solar modules create electricity. This class offers the students a very good "Hands On" training session showing how the entire PV system is assembled, the component parts are wired together by the students, array is assembled, trouble shooting is demonstrated, commission steps taken and the system is activated "heated up". You learn many facets of the solar installation process, how the entire solar system functions within the existing home and electrical grid. Any construction and electrical experience is helpful in the actual "hands on" or installation phase of this industry.
ARIZONA – Prescott **Prescott College** Environmental Studies 220 Grove Avenue Prescott, AZ 86301 **Contact:** David Hanna, Instructor	**Small-scale Energy Solutions & Photovoltaic System Design: ENV41310** This course investigates the role that small-scale energy systems can play in addressing sustainability on the global energy front. An overview of energy sources will be discussed with focus on readily available technologies such as photovoltaic (PV), wind and micro-hydro energy systems. We will compare and contrast the attributes of grid-tied systems and independent, off-grid,

E-mail: dhanna@prescott.edu **Tele.** (928) 350-2224 **www.prescott.edu**	energy systems. Students will quantitatively evaluate their personal energy consumption patterns and apply this knowledge to assess conservation strategies. This information will be applied to developing skills in designing a small-scale photovoltaic energy system. Students will develop an understanding of the necessary components of a PV system, installation design strategies, code requirements and currently available state and federal incentive programs.
ARIZONA – Scottsdale **Sonoran Desert Institute** 10245 East Via Linda, Suite 110 Scottsdale, AZ 85258 **Contact:** Thomas A. Kube **E-mail:** tkube@kubeco.com **Tele.** (480) 314-2102 **www.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: • 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 – East Campus** 8181 E. Irvington Rd. Tucson, AZ 85709 **Contact:** Tom Tomasky – Division Dean **e-mail:** ttomasky@pima.edu **Tele.** (520) 206-7694 **www.pima.edu**	**ENV 198T1:** Introduction to photovoltaic (solar) energy. Includes practical history, applications and installation of PV energy systems in residential and light commercial buildings (not intended to replace NEC or UBC electrician standards or guidelines). Designed for students seeking employment within the solar industry or installation skills for use in their own home. 4 credit hours, lecture and lab.
ARIZONA – Tucson **Pima Community College – West Campus** 2202 W. Anklam Road Tucson, AZ 85709 **Contact/Instructors:** Lazaro Hong, Ph.D, Chien-Wei Han, Ph.D **e-mail:** 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. **(Please note: Exam given at East Campus)**
ARIZONA – Tucson **Tucson Electrical Joint Apprenticeship & Training Program** 1665 E. 18th Street, Suite 107 Tucson, AZ 85719 **Contact:** Karen King, Training Director	**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.

Tele. (520) 790-4690 **www.ibew570.org**	
ARIZONA – Yuma **Arizona Western College** PO Box 929 Yuma, AZ 85366-0929 **Contact:** Marcus Johnson, Dean of Career & Technical Education Division **Tele.** (928) 344-7769 **Email:** marcus.johnson@azwestern.edu **www.azwestern.edu**	**Pending course description**
CANADA – ONTARIO – Markham **Solar Academy International** 15 Allstate Parkway, Ste. 600 Markham, ON L3R 5B4 Canada **Contact:** Jacob Travis, Director **Tele.** (647) 969-7191 **Email:** Jacob@solaracademy.ca **www.solaracademy.ca**	**5-Day Solar PV Design and Installation Course** This course goes by the 10 NABCEP Entry Level learning objectives, step by step, in detail. Additionally, we have hands-on components with rooftop racking systems and some one hour presentations by local manufacturers.
CANADA – ONTARIO – Missassauga **Infinite Solar, Inc.** 1415 Bonhill Road, Unit 3 Mississauga, ON L5T1L3 Canada **Contact:** Trisha Egbert, Executive Director **Tele.** (215) 464-6460 **Email:** trisha@infinite-solar.com **www.infinite-solar.ca**	**Pending course description**
CANADA – ONTARIO - Newcastle **College of Renewable Energy** 3377 Lockhart Road Newcastle, Ontario, L1B1L9 Canada	**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

Contact: Philip Coulter, Dean of Training **Tele.** (905) 987-5475 Email: pecoulter@live.com www.collegeofrenewableenergy.com	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.
CANADA – ONTARIO – Toronto **Willis College** 3040-3080 Yonge St., Box 22 Toronto, ON M4N 3N1 Canada **Contact:** Ron Brandt, Director **Tele.** (416) 485-8588 Email: ron.brandt@torontocentre.williscollege.com **www.torontocentre.williscollege.com**	**Ontario Solar Energy Technician Certificate** PV Markets and Applications, Safety Basics, Electrical Basics, Solar Energy Fundamentals, PV Module Fundamentals, System Components, PV System Sizing Principles, PV Systems Electrical Design, PV System Mechanical Design, Performance Analysis, Maintenance and Troubleshooting, Ontario Fit & Microfit Program.
CALIFORNIA – Aptos **Cabrillo College** 6500 Soquel Drive Aptos, CA 95003 **Contact/Instructor(s)**: Chuck Mornard, Joe Jordan, Steve Murphy **e-mail:** 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 **e-mail:** dteasdal@kccd.edu **Tele.** (661) 336-5011 http://www.kccd.edu	Course Title: **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.
CALIFORNIA – Blythe **Palo Verde College** One College Drive Blythe, CA 92225 **Contact:** George Walters, Associate Dean **e-mail** : george.walters@paloverde.edu **Tele.** (760) 921-5507	**Solar PV Theory and Applications** This course will examine the theoretical and technical dimensional 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 payback 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 to be a comprehensive, stand alone course as it pertains to residential/commercial applications and NABCEP exam preparation. The course curriculum was modeled after the Los Angeles Unified School District curriculum as recommended by Brian Hurd, former instructor. Primary Text: Dunlop, J., Photovoltaic Systems, American Technical Publishers (2007), and the NABCEP Study Guide.
CALIFORNIA – Calexico **CCAC International Polytechnic Institute** 2320 M.L. King Calexico, CA 92231 **Contact: Enrique G. Alvarado** **e-mail** : 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 – Carlsbad **Applied Professional Training, Inc.** 5751 Palmer Way, Suite D. Carlsbad, CA 92010 **Contact:** Jeff Fairbanks **e-mail**:jfairbanks@aptc.edu **Tele.** 800.431.8488 **www.aptc.com**	**Basic Photovoltaic Design and Installation:** Our courses cover the basics of PV applications and markets, basic to advanced electricity theory, in depth NEC codes, standards, installation scenarios of various types and various roofing materials. The courses teach individuals all phases of PV usage as it relates to system design, electrical design, mechanical layout & design, reading of blueprints and equipment specs. They cover the various types of modules and inverters, their usages, how to perform site evaluation, how to troubleshoot a system, the maintenance of systems and the safety basics for the field and systems.

CALIFORNIA – Cotati **Sun Pirate, Inc** P.O. Box 187 Cotati, CA 94931 **Contact:** Roger Coghlan, President **e-mail**:ret-training@sunpirate.com **Tele.** 707.792.6929 **www.sunpirate.coursehost.com**	**Pending Course Description**
CALIFORNIA – El Centro **Imperial Valley Regional Occupational Program** 687 State Street El Centro, CA 92243 **Contact:** Phil Villamor, Program Coordinator **e-mail**: pvillamor@ivrop.org **Tele.** (760) 482-2605 **www.ivrop.org**	**Beginning Photovoltaic Power Generation** This course provides students with a basic knowledge of solar photovoltaic (PV) cells, modules, and system components; electrical circuits; PV design, estimation, and code requirements; solar electric products and applications; an understanding of the energy conversion of sunlight to electricity, and working with solar conversion equipment. Upon successful completion of this course, students will have a basic understanding of electricity and how it works, basic skills for residential wiring, a basic understanding of photovoltaics and photovoltaic installation. Students will also be instructed on job-site safety and electrical safety. The textbook that will be used for this course is Photovoltaic Systems 2nd edition by Jim Dunlop.
CALIFORNIA – Eureka **College of the Redwoods** Dept.: Applied Technology 7351 Tompkins Hill Rd. Eureka, CA 95501 **Contact:** Steve Brown, Dean, Career and Technical Education **e-mail**: steve-brown@redwoods.edu **Tele. (**707) 476-4347 **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.
CALIFORNIA – Fairfield **Solano Community College** Math and Science 4000 Suisun Valley Road Fairfield, CA 94534 **Contact:** Paul Fair, Green Technology Program Manager **email** : rrun123@aol.com **Tele.** (707) 494-9587 **www.solano.edu**	**Solar PV Fundamentals for Design and Installation** This course provides 30 classroom instruction hours covering an overview of grid-tied and off-grid PV system applications, primarily focusing on grid-tied systems, with an additional 12 hours of hands-on activities. The course goal is to create an understanding of core concepts necessary to work with all PV system components as outlined in the NABCEP Entry Level Exam learning objectives, including PV markets and applications, fundamentals of electricity and solar energy, systems components, site analysis, PV module criteria, mounting solutions, safety and commissioning. The course also covers sizing a residential grid-tied system, wire sizing, overcurrent protection and grounding. Assembly of a ground-mounted 3-panel

	system highlights the hands-on activity sessions.
CALIFORNIA – Fremont **Boots on the Roof (a div. of Unitek Education)** 4670 Auto Mall Pkwy Fremont, CA 94538 **Contact:** Steve Watkins **email** : stevew@bootsontheroof.com **Tele.** (888) 893-0367 **www.bootsontheroof.com**	The Solar PV Boot Camp uses a blended mix of instructor-led training, hands-on labs, and computer-based software tools to teach solar-electric system design, installation, and industry topics important for business & sales professionals. The course is optimized for architects, engineers, licensed or journeyman electricians, general contractors, and other home-improvement contractors looking to add solar to their existing service offerings. Students will wire up inverters from a variety of manufacturers and mount panels on different racking systems common to residential and commercial installations. We demonstrate the connection of a live solar array feeding power into the grid. The techniques of site assessment, power & finance estimation, and system sizing are taught using a combination of hands-on tools and software on Internet-connected PCs at each student's desk.
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	**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 – Huntington Beach **Golden West College** 15744 Golden West Street Huntington Beach, CA 92647 **Contact:** Tom Hersh, Professor, Environmental Studies/Engineering **Telephone:** (714) 895-8224 **Email:** thersh@gwc.cccd.edu http://www.goldenwestcollege.edu/environment	**Course description pending**

CALIFORNIA – Laguna Hills **Allied Business Schools** 22952 Alcalde Drive Laguna Hills, CA 92653 **Contact:** Jesse Marcks – Renewable Energy Admissions Manager **Telephone:** (800) 732-7410 **www.training4green.com**	**Introduction to Photovoltaic Systems** – Students learn the fundamentals of electricity and solar energy, including how to calculate simple circuit values and predict solar position using a variety of tools and techniques. These concepts are then applied to all the considerations needed in site evaluation, including load (electrical demand) analysis as well as decisions among several types of PV system configurations and mountings. System sizing and the mechanical and electrical integration for both stand-alone and grid-interactive PV installations are covered in detail. Performance analysis and issues, along with troubleshooting techniques, are important parts of this material. Completion of this course will give students a thorough understanding of photovoltaic systems and their applications, as well as all the basics for designing, installing, and maintaining them. Students will be prepared to take the North American Board of Certified Energy Practitioners (NABCEP) PV Entry Level examination.
CALIFORNIA – Livermore **Solar Universe, Inc.** Solar University, Training Division 5902 Las Positas Road 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.
CALIFORNIA – Los Angeles **Abram Friedman Occupational Center** 1646 South Olive Street Los Angeles, CA 90015 **Contact:** Victor Gomez, Assistant Principal **Email:** vgomez@lausd.net **Tele.** (213) 765-2400 **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	**Photovoltaics/1 #62-65-50 (90 hours)** **Photovoltaics/2 #62-65-60 (90 hours)**

East Los Angeles Occupational Center 2100 Marengo Street Los Angeles, CA 90033 **Contact:** George J. Ryan, Electrical Instructor **Email:** Gryanrdrgn@aol.com **Tele.** (323) 223-1283 ext. 159 **www.elaoc.org**	**Photovoltaics/3 #62-65-70 (180 hours)** The three above courses are aligned with the North American Board of Energy Practitioners (NABCEP) 10 learning objectives. Upon completion students can sit and take the NABCEP Entry Level Exam.
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 **Email:** robinsds@lattc.edu , elartowd@lattc.edu **Tele.** (213) 763-3700 **www.lattc.edu**	**ECONMT 105: Fundamentals of Solar Electricity** (Traditional classroom lecture with demonstrations) **ECONMT110: Renewable Energy Systems** (Traditional classroom lecture with demonstrations) **ECONMT205: Solar Energy Installation & Maintenance** (hands-on lab where students will install and troubleshoot operational systems)
CALIFORNIA – Los Angeles **New Technology Training Center** 3171 Casitas Ave, Suite 145 Los Angeles, CA 90039 **Contact:** Hamid Kowsari, President **Email:** ntti@newtechtrain.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 – Menlo Park **JobTrain** 1200 O'Brien Drive Menlo Park, CA 94025 **Contact:** Alonzo Emery, Director of Program Operations **Email:** aemery@jobtrainworks.org **Tele.** (650) 330-6424 **www.jobtrainworks.org**	**Two options:** **Solar Energy: Design and Installation** Module 1 is 12 weeks, 9 hours weekly and 2 evenings and a Saturday morning every week for a minimum total of 108 hours. Participants will gain technical skills and a strong foundation of how to safely install grid-tied solar electric systems in the Bay Area. This course starts out with the very basics of electricity, solar cycles, photovoltaics (PV) and incrementally accelerates students to photovoltaic hands-on labs. Further real experience is gained by actual job site installation experience with Grid Alternatives, Habitat for Humanity, and others, as available from third parties. **Solar Energy: Design, Installation and Remediation** Modules 1-6 (Module 7: optional, extra hours) are 21 weeks, 6 hours daily and 5 days a week for a minimum total of 600 hours. Participants will gain technical skills and a strong foundation of how to safely install grid-tied photovoltaic (PV) solar electric systems for the Bay Area. Additional trade/skills include energy efficiency: energy audit, test-in and test-out measurements and remediation for a healthy house. Participants will demonstrate design and build. This course starts out with the very basics of electricity, solar cycles, photovoltaics (PV) and incrementally accelerates students to photovoltaic hands-on labs. Further real experience is gained by actual job site installation experience with Grid Alternatives, Habitat for Humanity, and others.
CALIFORNIA – Newark **Ohlone College** 39399 Cherry Street, Newark, CA 94560 **Contact:** Narinder Bansal **Email:** nbansal@ohlone.edu **Tele.** (510) 742-2360	**ENVS 104 PV Installation and Design** is a beginning course in Solar Electricity. Students learn the basics of AC and DC electricity and practice wiring series, parallel, and series-parallel circuits using small solar modules, analogue and digital meters. Students learn the three major types of residential PV systems—utility interactive, interactive with battery backup, and stand alone. They are given hands-on practice wiring up stand alone systems; they also wire and install a complete 300 volt DC utility interactive system. Students also learn the process of engineering all three types of systems. For their final project students size a residential system, choose components, and produce a three line diagram of their designs. Safety is a major element of this course. Students study and practice proper procedure for wiring up systems that are over 300 volts DC using full-sized solar modules that are wired in strings of up to eight 24 volt modules.
CALIFORNIA – Novato **Marin Community College District – College of Marin** 1800 Ignacio Blvd. Novato, CA 94949 **Contact:** Laurie Loeffler **Email:** laurie.loeffler@marin.edu	**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.

Tele. (415) 457-8811 ext. 8108	
CALIFORNIA – Oakland **The English Center** 66 Franklin St, Suite 300; Jack London Square Oakland, CA 94607 **Contact:** Michael Goldberg **Email:** operations@englishcenter.edu **Tele.** (510) 836-6700 ext. 104	**Basic Photovoltaic Design and Installation**: An introductory course in the study of solar photovoltaic (PV) cells, modules, and system components; electrical circuits; PV system design and sizing for use on homes; and solar electric products and applications. The course includes classroom and lab hours providing a general knowledge of the principles of solar electricity, the mechanics and engineering of solar power systems; how to work with tools, how to install solar panels; health and safety issues and requirements pertinent to the solar workplace (OSHA and NEC requirements) and hands-on installation of a grid-tied system
CALIFORNIA – Oakland **Laney College (Peralta Community College District)** 900 Fallon Street Oakland, CA 94607 **Contact:** Stephen T. Weldon, Instructor **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** Department of Community Services and Business Development 1 Barnard Drive 3333 Manchester Ave. Oceanside, CA 92056 Cardiff, CA 92007 **Contact:** Linda Kurokawa, Director **Email:** lkurokawa@miracosta.edu **Tele.** 888.895.8186 **www.miracosta.edu/community** **www.mccae.org**	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 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 – Oroville **Butte College** Contract Education, Career and Technical Education 3536 Butte Campus Drive Oroville, CA 95926 **Contact:** Jon Stallman, Sustainability	Solar PV – Installation and Design Level 1 is an entry-level solar design and installation fundamentals course intended to develop theory and practical knowledge of installation processes. The primary objective of this course is to provide the student with industry accepted solar PV design objectives with an exposure to installation techniques and practices.

Coordinator **Email:** stallmanjo@butte.edu **Tele. (**530) 893-7735 **www.butte.edu**	
CALIFORNIA – Palm Desert **College of the Desert** Applied Sciences and Business 43-500 Monterey Ave. Palm Desert, CA 92260 **Contact:** Larry McLaughlin, Director, ATTE **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 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.pasaedna.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 **E-mail**: tchatagnier@dvc.edu **Tele**. (925) 685-1230, Ext. 2522	**Photovoltaic System Design and Installation (AET 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 – Redbluff **Shasta College**	Hybrid OSHA training is first in sequence and includes OSHA 10 hr, confined space, fall protection, CPR/First Aid/AED. The next class is Industrial Technology boot camp which covers tools and usage. The

Economic and Workforce Development 900 Palm St. Redbluff, CA 96080-2626 **Contact/Instructor:** Suzanne Clark, Asst Project Director **E-mail**: sclark@shastacollege.edu **Tele**. (530) 529-8973 **www.shastacollege.edu**	Electricity/Electronics boot camp cover electricity basics, solar energy/electricity fundamentals, PV system electrical design. The Photovoltaic boot camp includes Intro to PV and Renewable Energy, module fundamentals, system components, system sizing, system mechanical design, performance analysis, troubleshooting, maintenance, and employability skills.
CALIFORNIA – Redding **Shasta Builders Exchange** 2985 Innsbruck Drive Redding, CA 96003 **Contact:** Cindy Weaselbear, Education Services Administrator **E-mail**: cindy@shastabe.com **Tele**. (530) 222-1917 **www.sbetrainingcenter.com**	**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.
CALIFORNIA – Riverside **Riverside Community College District** Dept.: Customized Training Solutions 14745 Riverside Dr. Riverside, CA 92518 **Contact:** Robert Grajeda, Director-Corporate Business Development **E-mail**: robert.grajeda@rcc.edu **Tele**. (951) 571-6457 **www.rcchelpsbusiness.com**	Photovoltaic Systems I is a comprehensive, introductory 80-hour course that will prepare the successful participants to sit for the NABCEP Entry Level Exam. The course is primarily lecture-based but does include a hands-on component. Jim Dunlop's textbook "Photovoltaic Systems" and the accompanying PowerPoint presentations are utilized with the goal of leading the student to enroll in Photovoltaic Systems II and III which will encompass a more hands-on approach. In order to more closely meet NABCEP's learning objectives, additional material has been included to cover basic mathematical skills, basic electricity, and basic safety skills needed for work in the solar industry.
CALIFORNIA – Riverside **UCR Extension** 1200 University Ave., Room #336 Riverside, CA 92507-4596 **Contact:** Jennifer Campbell, Program Coordinator **E-mail**: jcampbell@ucx.ucr.edu **Tele**. (951) 827-1620 **www.extension.ucr.edu**	**NABCEP Solar Photovoltaic Entry Level Training** This training course prepares individuals to enter into the solar field and to prepare to take the NABCEP PV Entry Level Exam. Topics include the fundamental principles of the application, design, installation and operation of grid-tied and stand-alone PV systems and provides a basic understanding of the objectives required by NABCEP. Upon the successful completion of the coursework, participants are eligible to take the PV Entry Level Exam provided at the conclusion of this course.

CALIFORNIA – Rocklin **Sierra College** Dept.: Sciences and Mathematics Division 500 Rocklin Rd. Rocklin, CA 95677 **Contact:** Michael Kane, Interim Dean, Sciences and Mathematics Division **E-mail**: 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, Professor **E-mail**: 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: Electronics 302, Energy 140/299, and then Energy 141 and 142 are taken concurrently. The students will be eligible to take the NABCEP C.O.K. 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 Dean Science, Math and Technology Division **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, Assistant Training	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.

Director **e-mail:** brichardson@sdett.org **Tele.** (858) 569-6633 www.positivelyelectric.com	
CALIFORNIA, San Diego **Troop Transition ("Troops 2 Energy")** 2386 Faraday Avenue, Suite 105 Carlsbad, CA 92008 **Contact:** Chris Lopez, Vice President **e-mail:** chris@trooptransition.com **Tele.** (760) 579-0800 www.troops2energy.com	**Troops 2 Energy** is dedicated to training active duty servicemen and women for a career in renewable energy. The course is a unique, dual-focused, entry level program that trains veterans-in-transition on safety, mechanical, and electrical systems related to the design, installation, and construction of Solar PV systems and Wind Turbines. The course is 270 hours in duration (75-Solar, 195-Wind) and consists of traditional classroom lecture, lab / practical application, and exams. The first module of the course ("Solar PV") is 3 weeks in duration and was developed with the NABCEP Learning Objectives as the foundation. At the completion of the training module, students will sit for the NABCEP PV Entry Level Exam for which Troop Transition is a registered provider.
CALIFORNIA – San Francisco **City College of San Francisco** 1400 Evans Avenue San Francisco, CA 94124 **Contact:** Clifford M. Parsley **E-mail:** cparsley@ccsf.edu **Tele:** (415) 550-4449 **www.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 lectures and 3 hours lab per week for 17.5 weeks.
CALIFORNIA – San Francisco **Treasure Island Job Corps** 351 Avenue H Harvey Milk Memorial Administration Building San Francisco, CA 94130-5027 **Contact:** Tom Huggett, Solar Instructor **E-mail:** Huggett.thomas@jobcorps.org **Tele:** (415) 352-2492 **http://Treasureisland.jobcorps.gov**	**Photovoltaic Systems: Design, Installation and Remediation** Modules 1-6 (Module 7: optional, extra hours) are 17 weeks, 6 hours daily and 5 days a week for a total of 510 hours. Participants will gain technical skills and a strong foundation of how to safely install grid-tied photovoltaic (PV) solar electric systems for the San Francisco Bay Area and USA. Additional trade/skills include energy efficiency: energy audit, test-in and test-out measurements and remediation for a healthy house. Participants will demonstrate design and build. This course starts out with the very basics of electricity, solar cycles, and incrementally accelerates students to solar PV labs. Further real hands-on experience is gained by actual job site installations at Treasure Island Job Corps Center.
CALIFORNIA – San Jose **Center for Employment Training (CET)** 701 Vine Street San Jose, CA 95110	A) 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

Contact: Scott Wynn, Green Resource Specialist **E-mail:** swynn@cet2000.org **Tele:** (408) 639-1174	Electricity, (7) Basic Photovoltaics, (8) Customer Service, (9) Computer Skills, and (10) Job Preparedness. B) 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 **Community Alliance for Career Training and Utility Solutions** 88 South 3rd Street San Jose, CA 95113 **Contact:** Derrick Chapman **E-mail:** dc@GreenCactus.org **Tele:** 1-800-996-3587	**Renewable Energy Technician**: Renewable energy systems including solar, wind, PV. Blueprint reading, safety and accident prevention, wiring methods, electrical fundamentals and basic theory, AC/DC. Maintaining and troubleshooting a PV system. Courses will be taught in a traditional classroom. Some courses will be offered online or simulcast. A course lab will also be offered off-site.
CALIFORNIA – San Jose **Metropolitan Education District** Central County Occupational Center 760 Hillsdale Avenue San Jose, CA 95136 **Contact:** Scott Hall **E-mail:** shall@metroed.net T**ele:** (408) 723-4222 **Instructor:** Jeff Ritchey **www.metroed.net**	**Solar Applications & Installation:** This course is designed to provide the learner with a broad view of solar installation. Students will receive hands-on training on the practical details of installing photovoltaic (PV) electric solar. The training provided will teach the skills necessary for an individual to work in the position of a general installer for a commercial PV solar installer. Students will be taught the basic thought process behind an installation, understanding solar terminology, and making correct decisions on location and installation of panels. Students will also learn to work in a safe manner regarding electrical and roof installation applications. In addition, students will learn solar array layout, attaching standoffs, racking, running conduit for electrical lines, and other techniques for efficient installation.
CALIFORNIA – San Jose **San Jose City College** 2100 Moor Park Ave. San Jose, CA 95128 **Contact/Instructor(s)**: Matthew Welch **e-mail:** 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.
CALIFORNIA – San Jose **Solar Training Institute, Inc.** 1430 Koll Circle, Ste. 105	**Course #500: PV Design and Installation** Course #500 is a comprehensive, hands-on Photovoltaic design and installation course that provides trainees instruction with the latest techniques required to install solar PV systems. Over the 40 hour course students

San Jose, CA 95112 **Contact:** Devin Ruiz, President **E-mail:** devin@trainingforsolar.com **Tele:** (408) 625-7400 **www.TrainingForSolar.com**	learn through a mix of classroom and solar lab work where they assemble and wire multiple operating grid-tied solar PV electric systems. Topics include: Overview of the PV industry, panel and inverter specs, grid-tied systems sizing and string calculations, site prep, industry tools, electrical analysis, mechanical attachment, combiner box configuration and wiring, PV array conductor and grounding wire configuration, OSHA safety standards, system commissioning and final inspection, maintenance and troubleshooting.
CALIFORNIA – San Jose **Workforce Institute** 600 S. Bascom Avenue, Ste. T-101 San Jose, CA 95128 **Contact:** Bill Dahl **E-mail:** bill.dahl@sjeccd.edu **Tele:** (408) 918-5103 www.wi-sjeccd.org	**Solar Installation** This class introduces the student to photovoltaic power systems. Upon completion the student will have a basic knowledge that can lead towards an entry level position in the field. The lab will be hands on demonstrations of a variety of systems seen and encountered in the industry.
CALIFORNIA – San Mateo **College of San Mateo** 1700 West Hillsdale Blvd. San Mateo, CA 94402 **Contact/Instructor(s)**: Thomas Diskin **e-mail: 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 Pedro **Harbor Occupational Center** 740 North Pacific Avenue San Pedro, CA 90730 **Contact**: Victor Abadia, Assistant Principal, Operations **e-mail:** victor.abadia@lausd.net **Tele.** (310) 547-5551 **www.harboroc.org**	**Photovoltaics 1/2/3** Competency-based courses designed for alternative and renewable energy technology. It provides students with project-based experiences in photovoltaic system selection, and mechanical design adaptation. Technical instruction includes an introduction and reviews of workplace safety policies and procedures, resource management, trade mathematics, and employability skills. Emphasis is placed on PV system hardware and component evaluation, site assessment techniques for finding suitable location for PV systems, sizing/costing/selection of PV systems based on site assessment results, and PV system mechanical design criteria and adaptations. The competencies in this course are aligned with the CA High School Academic Content Standards and the California Career Technical Education Model Curriculum Standards.
CALIFORNIA – Santa Monica **Santa Monica College** 1900 Pico Blvd. Santa Monica, CA 90405 **Contact/Instructor(s)**: Dr. Patricia Ramos, Dean of Workforce & Economic Development; Sandra Sanchez, Project Manager **E-mail:** sanchez_sandra@smc.edu **Phone:** (310) 434-4199 **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.
CALIFORNIA – Santa Rosa **Elkins Marine Training International**	**Introduction to Photovoltaic Systems Design & Installation:** The goal of this course is to develop students' understanding of basic design and installation principles of PV systems, as set forth in Article 690 of the 2008 NEC. Students will learn the essentials of

PO Box 2677 Santa Rosa, CA 95405 **Contact:** Dr. David Byrd, Jr., VP, Dean **E-mail:** jdbyrd@elkinstraining.com **Tele.** (707) 792-5678 **www.elkinsmarine.com**	integrating PV into electrical distribution systems. They will become familiar with the following tasks: conducting a PV site analysis; specifying a PV system size based upon loads; compiling balance-of-system materials lists; wire sizing and overcurrent protection; observance of prescribed safety protocol. The course structure will be a bootcamp format including classroom instruction and hands-on exercises.
CALIFORNIA – Santa Rosa **Santa Rosa Junior College** 1501 Mendocino Ave Santa Rosa, CA 95401 **Contact:** Kimberlee Messina, Dean, Science Technology & Mathematics **E-mail:** 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 – Sunnyvale **California South Bay University** 762 San Aleso Ave. Sunnyvale, CA, 94085 **Contact:** Cynthia Wan, Director of Academic Affairs **E-mail:** wan@csbu.us **Tele.** (408) 400-9008 **www.csbu.us**	California South Bay University (CSBU) offers a certificate program in Solar Photovoltaic System Design and Installation. The course is designed for students who are interested in developing a career in Photovoltaics and to prepare them for the NABCEP Entry Level Exam from the North American Board of Certified Energy Practitioners (NABCEP). This course will provide a comprehensive coverage of stand-alone, utility interactive and dedicated load applications for solar electricity. Participants will gain a detailed understanding of: --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
CALIFORNIA – Victorville **Victor Valley College** 18422 Bear Valley Road Victorville, CA 92395-5850 **Contact:** Nord Embroden, Program Facilitator **E-mail:** embrodenn@vvc.edu **Tele:** (760) 245-4271 ext. 2246	**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

www.vvc.edu	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, Dean of Academic Services **E-mail:** 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 **Los Angeles Pierce College** 6201Winnetka Ave., #226 Woodland Hills, CA 91371 **Contact:** Judith Trester, Director, Economic & Workforce Development **E-mail:** trestejd@piercecollege.edu **Tele:** (818) 710-2549 **www.piercecollege.edu/workforce**	**Solar Photovoltaic Installer with Bridge Program** This solar PV installer course is based on mastering 10 task areas as specified by NABCEP. Students will first go through an English and Math 16 hour Bridge Program and will then transition into the solar PV class. The solar PV class will use a mix of traditional classroom lectures for 50 hours and hands-on labs for an additional 14 hours, resulting in a 64 hour course that will prepare students to take the Entry Level PV Exam.
CALIFORNIA – Woodland Hills **West Valley Occupational Center** Photovoltaics 6200 Winnetka Ave. Woodland Hills, CA 91367 **Contact:** Luis A. Lopez, Assistant Principal Operations **E-mail:** llopez28@lausd.net **Tele:** (818) 346-3540 x. 291 **www.wvoc.net**	**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.
COLORADO - Aurora **Community College of Aurora** 16000 East CentreTech Parkway Aurora, CO 80011 **Contact:** Tom Dillon, Renewable Energy	**Solar Photovoltaic System Installer Technician** This program is designed to provide students with the knowledge and skills needed to work as an entry level technician for a photovoltaic (PV) dealer, installer or contractor. In this course of study the student is introduced to basic electrical theory, system design criteria, installation methods, safety considerations and maintenance practices through classroom study and field

Programs Coordinator **e-mail**: Tom.Dillon@ccaurora.edu **Tele.** (303) 340-7046 **www.ccaurora.edu**	work applications. This achievement is beneficial to individuals who plan to be employed in or who currently work in the solar PV industry.
COLORADO - Denver **Denver Joint Electrical Apprenticeship & Training Committee** 5610 Logan Street Denver, CO 80216 **Contact:** Dan Hendricks, Training Coordinator **e-mail**: dhendricks@djeatc68.com **Tele.** (303) 295-1903	**Installing Photovoltaic Systems:** This 48 hour course covers fundamentals, design, and installation of PV systems, and involves hands-on work. This program is intended for electricians, contractors, utilities and engineers, with an overall goal of developing system knowledgeable professionals to help ensure success of PV installations. The format includes both classroom instruction and student-interactive exercises involving the complete step-by-step process of designing, installing and commissioning PV systems.
COLORADO - Denver **Quinntas Renewable Energy** 930 W. Byers Place Denver, CO 80223 **Contact:** Taty Helguero, Director of Program Development **e-mail**: taty.h@quinntas.org **Tele.** (303)733-4055 www.quinntas.org	**Fundamentals of Renewable Energy Leadership and Management** 1. All facets f Renewable Energy, business, employment, certifying or licensing authorities, association information 2. Career ladder in the industry. Leadership and managerial skills. **Basic Photovoltaics Design & Installation** 1. Calculations and design of solar panels, types of installation: grid tied systems, stand alone systems, batteries, types of solar cells, panels, wiring methods, inverters, net meter and Utility companies, usage of solar pathfinders, perform drawings, schematics for PV systems, perform systems check out and inspections, analyze and interpret results, safety standards, troubleshooting, conversions, equations for electrical energy, watts, kilowatts, amps. 2. National Electrical Code 690: Related to PV, Wind and solar thermal. **Algebra and Pre-Calculus** 1. Algebra, trigonometry, pre-calculus as it relates to energy efficiency calculations and PV system design. **OSHA 30** – Construction
COLORADO - Denver **Rocky Mountain Chapter IEC** 480 E. 76th Ave., Bldg. 5, Unit A/B Denver, CO 80229 **Contact:** Paul Schmid, Training Director **e-mail**: paul@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

Tele. (303) 853-4886 **www.iecrm.org**	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 considerations. The NABCEP Job Task Analysis will be the central focus of all hands-on components of the course.
COLORADO - Denver **Thames Solar Electric** 175 South Dale Court Denver, CO 80219 **Contact:** Donna Wedemeyer, Office Administrator **e-mail**: thamessolar@earthlink.net **Tele.** (303) 922-2063 **www.thamessolar.com**	**Course description pending**
COLORADO, Lakewood **Red Rocks Community College** 13300 W. 6th Ave, Lakewood Colorado 80228 **Contact:** Larry Snyder, Coordinator, Renewable Energy Technology; Construction Technology. **e-mail**: Larry.Snyder@rrcc.edu **Tele. (**303) 914-6306 **www.rrcc.edu**	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 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 or show that they have these skills.
COLORADO, Littleton	The following sequence of classes is offered as a non-

Arapahoe Community College Main Campus 5900 South Santa Fe Drive P.O. Box 9002 Littleton, CO 80160 **Contact:** Vicki Befort, Energy Technology Coordinator **E-Mail:** vicki.befort@arapahoe.edu **Tele.** (303) 797-5958 **www.coloradotraining** **www.arapahoe.edu** **Instructors: Larry LeDue, John Hall, Troy Wanek, Jake Tornatzky**	credit or credit option for a certificate in Solar PV and/or Solar Thermal. Students can complete the program in approximately 3 months. For more detailed information and schedule go to http://www.arapahoe.edu/departments-and-programs/a-z-offerings/energy-technology . **Solar PV Systems Technician** ENY 101 Intro to Energy Technologies OSH 127 10-HR OSHA Construction Industry Standards EIC 105 Basics Of AC & DC Electricity ENY 121 Solar Photovoltaic Components ENY 127 Solar PV System Install ENY 175 Field/Lab Experience (Capstone) NABCEP Exam **Active Solar Thermal Systems Technician** ENY 101 Intro to Energy Technologies OSH 127 10-HR OSHA Construction Industry Standards PLU 101 Piping Skills ENY 120 Solar Thermal System Install ENY 225 Solar Domestic Hot Water Systems ENY 176 Field/Lab Experience (Capstone)
COLORADO, Paonia **Solar Energy International** 39845 Matthews Lane Paonia, CO. 81428 **Contact/Instructor(s): Tawnya Parker** **e-mail: tparker@solarenergy.org** **Tele. (**970) 527-7657 x206 **http://www.solarenergy.org/**	**PV Design and Installation** (Both **Online** and hands-on courses are available) *Note: Exam for online course must be taken with Approved Provider* **http://www.solarenergy.org/**
COLORADO, Rifle **Colorado Mountain College** Integrated Energies Department 3695 Airport Road Rifle, CO 81650 **Contact:** Jon Prater, Integrated Energies Department Program Coordinator **E-Mail:** jprater@coloradomtn.edu **Tele.** (970) 987-1833 **http://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, Middletown	**Introduction to Photovoltaics**

Middlesex Community College 100 Training Hill Road Middletown, CT 06457 **Contact:** Ian Canning, Director of Business & Industry Services **Email:** icanning@mxcc.commnet.edu **Tele.** (860) 343-5710 **www.mxcc.commnet.edu**	This course covers the basics of siting, designing, and installing photovoltaic (PV) systems. We will look at the solar resource, shading problems, and optimizing orientation and tilt for PV arrays. We'll discuss the basic system designs to serve an electrical load as well as safety practices for installers and study the electrical code for PV systems. We will study various mounting systems for PV arrays and their affect on roofs. The course includes sizing systems for grid-connected and off-grid PV systems. Students and instructors will also install a PV system. The objective of this class is to train students in the basics of PV systems. Students who pass the classroom assessment will be eligible to take the NABCEP PV Entry Level exam. The curriculum for this course was developed with NABCEP Certified PV Installer, ISPQ Certified Master Trainer Gay Canough, and NABCEP Certified PV Installer Gail Burrington. Gay and Gail have taught over 150 PV installer courses and installed over 1 MW of PV.
CONNECTICUT, North Haven **Gateway Community College** 88 Bassett Road North Haven, CT 06473 **Contact:** Dr. David N. Cooper, Dean, Corporate and Continuing Education Department. **Email:** dcooper@gwcc.commnet.edu **Tele.** (203) 285-2426 **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.
CONNECTICUT, Rocky Hill **Independent Electrical Contractors of New England, Inc.** 1800 Salas Deane Highway Rear Building Rocky Hill, CT 06067 **Contact:** Earl Goodell, Training Director. **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, Training Director **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.
CONNECTICUT, Waterbury **Naugatuck Valley Community College** 750 Chase Parkway Waterbury, CT 06708 **Contact:** Mary Ann Fontaine, Director, Center for Business & Industry Training **Email:** mfontaine@nvcc.commnet.edu **Tele.** (203) 596-2143 **www.nvcc.commnet.edu**	**Introduction to Photovoltaics** This course covers the basics of siting, designing, and installing photovoltaic (PV) systems. We will look at the solar resource, shading problems, and optimizing orientation and tilt for PV arrays. We'll discuss the basic system designs to serve an electrical load as well as safety practices for installers and study the electrical code for PV systems. We will study various mounting systems for PV arrays and their affect on roofs. The course includes sizing systems for grid-connected and off-grid PV systems. Students and instructors will also install a PV system. The curriculum for this course was developed with NABCEP Certified PV Installer, ISPQ Certified Master Trainer Gay Canough, and NABCEP Certified PV Installer Gail Burrington. Gay and Gail have taught over 150 PV installer courses and installed over 1 MW of PV.
FLORIDA, Cocoa **University of Central Florida** Florida Solar Energy Center 1679 Clearlake Road Cocoa, FL 32922 **Contact:** Kelly Slattery-Snavely **Email:** kelly@fsec.ucf.edu **Tele.** (321) 638-1420 **To register go to:** **www.fsec.ucf.edu and search on "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, Cocoa **Brevard Community College** 1519 Clearlake Road Cocoa, FL 32922	**Introduction to Photovoltaics** This course introduces students to the theory of operation of photovoltaic systems including their application to homes and small commercial buildings, site selection/survey, system components, reliability and maintainability requirements of systems.

Contact: Sheryl Awtonomow, Director, Career and Technical Programs **Email:** awtonomows@brevardcc.edu **Tele.** (321) 433-7474 **www.brevardcc.edu**	**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 stand alone systems.
FLORIDA, Coconut Creek **Atlantic Technical Center** 4700 Coconut Creek Parkway Coconut Creek, FL 33063 **Contact:** Elissa Harvey, Green Ready Programs Department Head **Email:** elissa.harvey@browardschools.com **Tele.** (754) 321-5154 **www.atlantictechcenter.com**	**Solar Photovoltaic Installation and Maintenance Technician** Atlantic Center's Solar Photovoltaic (PV) Installation and Maintenance program offers a sequence of courses that provide coherent and rigorous New Energy content. According to national and local standards, students will be trained using hands-on experiences in the actual installation of a PV system, including transporting and fitting appropriate materials. Also, training will include the testing of the PV system components in order to ensure optimum performance and safety. This program is designed to prepare students to enter the emerging alternative energy industry workforce.
FLORIDA, Coral Springs **US Solar Institute** 4550 SW 126th Street Suite 101 Coral Springs, Fl 33065 **Contact:** Raymond Johnson, President **Email:** ray@ussolarinstitute.com **Tele.** (305) 744-3445 **www.ussolarinstitute.com**	**PV 201 - Photovoltaic (PV) System Design Installation and Maintenance** Course focus is on the design, installation, and maintenance of PV systems. Students will learn in a hands-on environment, the techniques used for proper installation and conversion of sunlight to electric power for both residential and commercial use. Our students will cover the following: Basic PV markets, safety fundamentals, basic electricity and terms, solar terms and fundamentals, PV fundamentals, balance of system components (BOS), PV system design and applications. Also covered will be safety, regulations, inspection and maintenance of PV electrical systems. The course topics will prepare a student for the technical portion of most state solar contractor exams, while adding a real world training aspect that is unique in the industry. The course is intended to meet and exceed the learning objectives and task analysis suggested by NABCEP.
FLORIDA, Gainesville **Gainesville Electrical Joint Apprenticeship & Training Committee** 113 NW 3rd Avenue, #211	**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.

Gainesville, FL 32601 **Contact/Instructor:** John Gurski **Email:** John@SullivanSolarPower.com **Tele.** (352) 258-5957 **www.Gainesvillejatc.org**	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, Solar Instructor **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.
FLORIDA, Hollywood **Sheridan Technical Center** Department of Energy 5400 Sheridan Street Hollywood, FL 33021 **Contact:** Thomas A. Moncilovich, Assistant Director **E-mail:** tmoncilovich@browardschools.com **Tele.** (754) 321-5435 **www.sheridantechnical.com**	**Solar Photovoltaic Design, Installation, and Maintenance Technician** Sheridan Technical Center's Solar Photovoltaic (PV) System Design, Installation, and Maintenance program offers a sequence of courses that provide coherent and rigorous New Energy content. According to national and local standards, students will be trained by hands-on experience in the actual installation of a PV system, including transporting and fitting appropriate materials. Also, training will include the testing of the PV system components in order to ensure optimum performance and safety. Finally, this New Energy PV program training will prepare students to enter the emerging alternative energy industry workforce.
FLORIDA, Jacksonville **Jacksonville Electrical JATC** 4951 Richard street, Jacksonville, FL 32207 **Contact:** James Nolan, Training Director **E-mail:** 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, Key West **Florida Keys Community College** 5901 College Road Key West, FL 33040 **Contact/Instructors:** Cathy Torres, Douglas Gregory **Email:** Cathy.Torres@fkcc.edu or drg@ufl.edu **Tele.** (305) 809-3250 or (305) 292-4501 **www.FKCC.edu**	**Intro to PV Design & Installation: Review of** PV history and industry needs. Course follows ATP PV Systems text supplemented with FSEC course material, and the SEI and Messenger/Ventre PV Systems textbooks. Emphasis on NEC & OSHA safety plus the ASCE 7-05 wind loading requirements. Targeted to tradespeople, inspectors & others interested in the details of installation requirements. Course is 32 hours of classroom over a 4 week period, plus an 8 hour hands-on laboratory installing a bimodal PV system.
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, Ocala **College of Central Florida** CF Institute 3001 SW College Road Ocala, FL 34474-4415 **Contact:** Jerone Gamble, Executive Manager of Continuing Education **Email:** jeronegamble@cf.edu **Tele.** (352) 854-2322 x1282 **www.cfitraining.cf.edu**	**Solar Electric** This is a 40 hour class and is designed fro students with some background or experience in working with solar installations. This class will provide more in depth information and knowledge in basic electricity while preparing students through classroom and hands-on training to sit for the NABCEP Entry Level Exam. **Solar Installation** Photovoltaic – this segment of this class is a 35 hour class over 5 days and includes classroom and practical experiences. This course is designed to prepare students who are not engineers or electrical professionals for a real-world application of skills by providing a basic understanding of the history of solar applications and the materials and requirements for installing photovoltaic equipment. Through hands-on training, students will have the opportunity to see classroom fundamentals in practice. By the end of the class, students will be prepared for the

	NABCEP Entry Level Exam.
FLORIDA, Winter Garden **Westside Technical Center/ Orange County Public Schools** 955 East Story Road Winter Garden, Florida 34787 **Contact:** Dr. Jody Newman **Email:** bryantj6@ocps.net **Tele.** (407) 905-2009 **www.westside.ocps.net**	**Basic Solar Installation**Westside Tech offers basic solar photovoltaic instruction for those seeking entry level training to become a solar installer. This course provides training in basic electrical principles and terminology focusing on electrical current flow and types of installation (students will learn to relate the three quantities of electrical current flow, identify series/parallel installation, explain the results of each installation, draw a series/parallel circuit and show the effect on current voltage and resistance); factors relative to site selection (conducting site surveys, evaluating roof accessibility/condition/age, shading/exposure), Hardware installation (proper selection of tools, lay out of mounting site, sealing techniques, mounting sequence), Maintaining and troubleshooting a system, and Panel Installation/Connections. Students will also be provided the opportunity to complete on-site solar photovoltaic practical application projects.
GEORGIA, Athens **Athens Technical College** 800 US Highway North Athens, GA 30601 **Contact:** Jill Turenne, Electrical Construction Program Chair **Email:** jturenne@athenstech.edu **Tele.** (706) 355-5049 **www.athenstech.edu**	**Photovoltaic Systems Installation and Repair Technician TCC** Photovoltaic Systems Installation and Repair Technician TCC provides students with an opportunity to enter the Electrical Construction Industry with skills specializing in electrical applications of installing, inspecting and repairing solar panel installations.
GEORGIA, Dahlonega **Solairgen** 119 Highway 52 West Dahlonega, GA 30533 **Contact:** Kelly Provence, President/Trainer **Email:** koprovence@solairgen.com **Tele.** (706) 867-0678 **www.solairgen.com**	**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 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, Dublin **Heart of Georgia Technical College** 560 Pinehill Road	**Solar PV 101: Entry Level** PV and Equipment Safety; Basics of Electricity; Efficiency Auditing and Implementation; PV System Types and Component Introduction; PV Modules and Specifications; Instrumentation Used in PV (DMM,

Dublin, GA 31021 **Contact:** Amy Harrelson, Director of Grants & Work Readiness **Email:** aharrelson@heartofgatech.edu **Tele.** (478) 274-3010 **www.heartofgatech.edu**	Clamp-on Meters, Pyranometers, etc.); PV System Design – Site Analysis, PV System Electrical (overview), Specifying an Inverter, PV System Mounting, PV System Sizing; Grounding; PV Electrical (in-depth) – System Wiring, Over-current Devices; Commissioning and Safety; Performance, Analysis and Troubleshooting.
GEORGIA, Oakwood **Lanier Technical College** 2990 Landrum Education Drive Oakwood, GA 30566 **Contact:** Dr. Linda Barrow, Vice President, Academic Affairs **Email:** lbarro@laniertech.edu **Tele.** (770) 531-6331 **www.laniertech.edu**	The planned 42-hour program would include an intensive, 40-contact-hour, noncredit Photovoltaic (PV) Entry Level course and a 2-hour exam. The course will be designed to • Familiarize students with a basic knowledge of PV systems, and • Prepare course completers to take and pass a North American Board of Certified Energy Practitioners (NABCEP) examination.
GEORGIA, Tifton **Moultrie Technical College** 52 Tech Drive Tifton, GA 31794 **Contact:** Whitney Hudson, Project Manager **Email:** whudson@moultrietech.edu **Tele.** (229) 391-3711 **www.moultrietech.edu**	The Photovoltaic Systems Technology program is a sequence of courses designed to prepare students for careers in the solar panel installation and Solar Power (PV) equipment industry. Learning opportunities develop academic, technical, and professional knowledge and skills required for job acquisition, retention, and advancement. The program emphasizes a combination of photovoltaic system design, component, and installation theory and practical application necessary for successful employment. Program material includes NABCEP Task Standards as preparation for independent NABCEP PV national certification examinations. Program graduates receive a Photovoltaic Systems Technology diploma which qualifies them as entry level Photovoltaic Systems Technicians.
HAWAII, Hilo **Hawaii Community College** 200 W. Kawili Street Hilo, HI 96720-4091 **Contact/Instructor(s)**: Deborah Shigehara, Interim Director **Email:** deborahs@hawaii.edu **Tele.** (808) 974-7531 **www.hawcc.hawaii.edu/ocet**	**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 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, Honolulu **Honolulu Community College** 874 Dillingham Boulevard Honolulu, HI 96817 **Contact/Instructor(s)**: Preshess Willets-Vaquillar, Program Coordinator **Email:** preshess@hawaii.edu **Tele.** (808) 845-9407 **http://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 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, Kahului **University of Hawaii Maui College** Office of Continuing Education and Training 310 Kaahumanu Avenue Kahului, HI 96732-1617 **Contact/Instructor(s)**: Stuart Zinner, Instructor **Email:** zinner@hawaii.edu **Tele.** (808) 984-3315 **http://maui.hawaii.edu**	**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 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 principals 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, Kauai **Kauai Community College** 3-1901 Kaumualii Highway Lihue, HI 96766 **Contact/Instructor**: Robert Conti, Construction Initiative Coordinator **Email:** rconti@hawaii.edu **Tele.** (808) 245-8327 **http://kauai.hawaii.edu**	**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 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.
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.
ILLINOIS, Carterville **John A. Logan College- Department of Continuing Education** 700 Logan College Road Carterville, IL 62918 **Contact:** Barry Hancock, Associate Dean for Continuing Education **Email:** barryhancock@jalc.edu **Tele.** (618) 985-2828 ext. 8202	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

Instructor: Auer Beck **www.jalc.edu**	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 **North American Board of Certified Energy Practitioners PV Entry Level Exam.** Contact Aur Beck at tech@aessolar.com.
ILLINOIS, Collinsville **Southwestern Illinois JATC** 2000 B Mall Street Collinsville, IL 62234 **Contact:** Donald Hasty, Training Director **Email:** dlhasty@309jatc.org **Tele.** (618) 343-1954 **www.309jatc.org**	**Photovoltaic I & II** Both courses follow the NJATC Photovoltaic Systems Textbook. In addition, we make use of the National Electric Code, NFPA 70E (safe work practices), and OSHA reference books. Classes cover NABCEP's 10 learning objectives. In addition, students will review the solar array installation that is operational at the Local 309 Training Center.
ILLINOIS, Crystal Lake **IBEW Local # 117 JATC** 765 Munshaw Crystal Lakes, IL 60014 **Contact/Instructor:** Ron Hansing, Training Director **Email:** ronh@ibew117jatc.com **Tele.** (847) 854-7200	**Photovoltaic Systems Class: Journeyman training** **Course:** this course introduces students to photovoltaic design, both mechanical and electrical. The course follows the PV systems textbook developed by ATP and the NJATC 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. In addition, the student will introduced to up to date information regarding the market conditions in the Solar industry, job activities and web sites for solar professional use. Each class will review the bimodal solar array installation that is operational at the training facility and review solar installation basics including setting up remote monitoring software.
ILLINOIS, Godfrey **Lewis & Clark Community College** 5800 Godfrey Road (TR145) Godfrey, IL 62035 **Contact:** Michael Morgan, Associate Professor **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, Program Coordinator and Professor **Email:** twilhelm@kcc.edu **Tele.** (815) 802-8864 **www.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, 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 PV COK 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: twilhelm@kcc.edu or 815-802-8864.
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.*
ILLINOIS, Rockford **IBEW Local 364** **Northern Illinois Electrical JATC** 619 Southrock Drive Rockford, IL 61102 **Contact:** Todd Kindred, Training Director **Email:** niejatc@jatc364.net **Tele.** (815) 969-8484 **www.ibew364.org**	**Photovoltaics Systems Level I** We will be learning the curriculum set by the NJATC. We will use the current student workbook and the Photovoltaic Systems textbook (second edition) by James Dunlop.

INDIANA – Fort Wayne **Fort Wayne Electrical Joint Apprenticeship Training Center** 138 Chambeau Road Fort Wayne, IN 46805 **Contact/Instructor(s)**: Gregory L. Fuller **e-mail:** 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 **e-mail:** dbartlett@browncо.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, Wichita **Wichita Electrical JATC** 810 West 13th Street Wichita, KS 67203 **Contact**: Tony Naylor, Training Director **Tele.** (316) 264-9231 **Email:** tnaylor@wejatc.org **www.wejatc.org**	**Pending course description**
KENTUCKY, Louisville **Louisville Electrical JATC** 4315 Preston Highway Louisville, KY 40213 **Contact**: Ben Kingren, Instructor **Tele.** (502) 581-9210 **Email:** bkingren@loujatc.com	**Kentucky's leading Green Energy Training Center for the Journeyman Electrician and Apprentice Electrician.** Our courses use the National Joint Apprenticeship and Training Committee's Green Technologies curriculum. This is a national curriculum to provide a standard that is a cut above the individual curriculums that crop up across regions or states. We offer a combination of classroom training accompanied with real hands on training to broaden the educational experience and maximize the curriculums impact on the student. Safety is always at the forefront of our training to comply with OSHA standards and the NFPA70E standard. We look forward to training you in the fundamentals today for a greener tomorrow.
LOUISIANA - Baton Rouge	**Solar Panel Design and Installation Course:** Students taking this course will learn up-to-date information in regards to solar panel design and

Baton Rouge Community College 201 Community College Drive Baton Rouge, LA 70806 **Contact**: Will Seaman, Program Director of the Economic Development Division **Tele.** (225) 216-8436 **Email:** seamanw@mybrcc.edu ; justin@gulfsouthsolar.com	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.
LOUISIANA - Louisiana Community and Technical College System **Region 1 – Jefferson Campus** **Region 4- Lafayette Campus** **Ontility** 3403 N Sam Houston W, Suite 300 Houston, TX 77086 **Contact:** John Berry, Director of Training Sales **Tele.** (512)784-6155 **Email:** john.berry@ontility.com **www.ontility.com**	**Solar Installer Training – Solar Electric Systems** The courses follow the ISPQ standards and NABCEP task analysis including recommended safety procedures, system design, electrical code and industry standard practices. The focus is to provide trainees with real life solar site specific knowledge. Hands-on training covers implementing the task analysis in the field with site analysis, mechanical and electrical design based on specific site conditions, site specific safety issues and construction issues using tools and testing equipment, best practice construction skills and specific site code and inspection issues. The 48 hours of instruction includes 40 hrs of classroom lecture, hand-on labs and hands-on installations and 8 hrs of homestudy.
MAINE, Fairfield **Augusta Electrical Joint Apprenticeship & Training Committee** 176 Main St. Fairfield, ME 049372 **Contact/Instructor(s)**: Christopher Trider, Training Director **Email:** chris@ibew1253.org **Tele.** (207) 453-0135 **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 **Contact/Instructor(s):** Greg Fletcher **e-mail:** gfletcher@kvcc.me.edu	**Introduction to Photovoltaics** (as part of the Energy Conservation & Management course) **PV Installation Workshop** (non-credit) through Continuing Education Division.

Tele. (207) 453-5000 **www.kvcc.me.edu**	
MARYLAND, Frostburg **Frostburg State University** 101 Braddock Road Frostburg, MD 21532-1099 **Contact:** Oguz A. Soysal, Hilkat S. Soysal, Program Directors **e-mail:** renewable@frostburg.edu **Tele.** (301) 687-7079 **http://www.frostburg.edu/renewable**	**Residential Photovoltaic System Design, Installation, and Maintenance:** Frostburg State University is offering an education program on design, installation, and maintenance of residential electric generation systems using photovoltaic (PV) solar modules and/or small wind turbines. This is an 8-week online course supported by on-site 3-day instruction and hands-on training. During every week of the online part, instructional materials will be posted on the course web site. The participants will have the flexibility to review the course materials and check their understanding at their own pace and schedule. A 3-day hands-on instruction and training will be held in the Compton Science Center at Frostburg State University.
MARYLAND, Lanham **JATC Local 26** 4371 Parliament Place, Suite A Lanham, MD 20706-6945 **Contact:** Thomas C. Myers **e-mail:** 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:** www.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 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.
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, Bourne **Upper Cape Cod Regional Technical School** Dept. of Construction Technology 220 Sandwich Road Bourne, MA 02532 **Contact:** James McCue **e-mail:** jmccue@uppercapetech.org **Tele.** (508)759-7711 **www.uppercapetech.com**	**Introduction to Photovoltaic Technology** This course will give students basic and elementary knowledge of residential and commercial scale photovoltaic systems. This course is intended for builders and electricians. This course will be taught in accordance with the PV Entry Level learning objectives.
MASSACHUSETTS, Brockton **Massasoit Community College** Dept. of Workforce Development & Community Education One Massasoit Blvd Brockton, MA 02302 **Contact:** Elaine Stewart, Dean **e-mail:** estewart@massasoit.mass.edu **Tele.** (508) 588-9100 ext. 1560 **www.massasoit.mass.edu**	**Solar (PV) Technology – Level I:** This 60-hour non-credit course provides the theoretical and technical knowledge necessary for a fundamental understanding of photovoltaic (PV) solar electric technology. It targets workers engaged in trades occupations, such as electricians, plumbers, construction workers, as well as individuals interested in learning more about PV technology. Basic PV history, terminology, safety and theory will be presented, as well as the current PV market and its position in the clean energy industry. Participants will acquire technical skills, such as basic electricity theory, solar energy measurement and conversion, system measurement and design, plus system output, analysis and troubleshooting. The course of study covers the learning objectives of the North American Board of Certified Energy Practitioners (NABCEP) and will prepare those interested to sit for the industry-recognized NABCEP Entry Level Exam. Interested participants must possess strong skills in basic algebra and calculations.
MASSACHUSETTS, Cambridge **HeatSpring Learning Institute**	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

501 Cambridge Street Suite 201 Cambridge, MA 02141 **Contact:** Brian Hayden, Director of Education **Email:** bhayden@heatspring.com **Tele.** (800) 393-2044 ext. 44	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.
MASSACHUSETTS, Fall River **Bristol Community College** Center for Business and Industry 777 Elsbree Street, Room D117 Fall River, MA 02720 **Contact:** Margarita Guedes, Assistant Director, Center for Business and Industry **Email:** margarita.guedes@bristolcc.edu **Tele.** (508) 678-2811 ext. 2264	**Photovoltaic System Design and Installation** This 60 hour course provides the theoretical and technological knowledge base for a fundamental understanding of solar PV 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] For course dates and registration information please visit www.bristolcc.edu/noncredit and search under green training
MASSACHUSETTS, Fitchburg **Montachusett Regional Vocational Technical School** Vocational Education 1050 Westminster Street Fitchburg, MA 01420 **Contact:** Katy Whitaker, Director, Career Services **Email:** Whitaker-katy@montytech.net **Tele.** (978) 345-9200 ext. 5253	This program is geared toward those looking to enter the exciting field of installing photovoltaic solar systems. The course uses a mix of instructor-led training, hands-on labs, and computer-based software tools to prepare students to enter the field. Students will be exposed to simulated field conditions and will participate in the construction of a utility interactive photovoltaic system. In addition, the course will prepare students to take the NABCEP (North American Board of Certified Energy Practitioners) Entry Level PV Exam. The 40 hour course is comprised of several learning modules including the 10 NABCEP learning objectives: · 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 In addition, the course will review several other topics related to solar system installations. · Site Survey and Preplanning · System Configurations · Mechanical and Electrical Integration (mounts,

	connections) · Permitting and Inspection · Connecting to the Utility Grid Prerequisite include: • Students should have a basic understanding of electricity and how it works. • In addition, students should have a working knowledge of basic math fundamentals including trigonometry! • Students should also have a working knowledge of hand tools including power drills, screwdrivers, measuring tapes, hammers, dry lines, speed squares, multi-meters, etc. Class Limit: 10 14 nights/40 hours $1,200
MASSACHUSETTS, Greenfield **Greenfield Community College** One College Drive Greenfield, MA 01301 **Contact**: Richard Gottlieb **Email:** sunnysde@sover.net **Tele.** (802) 254-4670	*** Introduction to Photovoltaic (Solar Electric) 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 a student 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 systems examples will reinforce classroom leaning. *** Photovoltaic (Solar Electric) Installation.** This course is designed for photovoltaic installers. Students will develop the knowledge and practical skills needed to install utility-connected and off-grid PV systems. Study of electrical 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.
MASSACHUSETTS, Holliston **Wayne J. Griffin Electric, Inc.** 116 Hopping Brook Road Holliston, MA 01746 **Contact:** Elizabeth Watson **Email:** ewatson@wjgei.com **Tele.** (508) 306-5315 www.waynejgriffinelectric.com	**Photovoltaic Exam Preparation** The program will prepare participants for the NABCEP Entry Level exam. The program is designed to provide proper installation and maintenance of photovoltaic systems. This will include instruction on the history of PV technology, safety, applications of solar electricity, site assessment, adapting mechanical and electrical design, installing subsystems and components at site, performing system checkout and inspection, and PV economics.
MASSACHUSETTS, Hudson **AltE University**	**The AltE U Basic (PV 301) and Intermediate PV Design & Installation (PV 302)** courses together are designed to provide a solid foundation for potential PV installers in five days (35 NABCEP hours). The hands-

43 Broad Street, Hudson, MA 01749 **Contact:** Dave Compaan **Email:** workshops@alteuniversity.com **Tele.** (877) 878-4060 ext. 144 http://workshops.altestore.com/	on lab components of the course reinforce the lecture concepts and include: site assessment; module wiring; module mounting; inverter wiring and visits to working PV systems. The class will cover both stand-alone (battery-based) systems and utility-interactive (grid-tied) systems. Topics include: working safely; site assessment; components and sizing; inverter string sizing; installation techniques and the National Electrical® Code. AltE U is proud to be an accredited Institute of Sustainable Power (ISP) Training Program provider. For more information: http://workshops.altestore.com/
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, Springfield **Center for Business and Technology, Springfield Technical Community College** 1 Federal Street, Bldg. 101-R Springfield, MA 01105 **Contact:** Mary Breeding, Asst. Vice President **Tele:** (413) 755-4501 **Tele:** (413) 755-4225 **Fax:** (413) 755-6319 breeding@stcc.edu **Instructor**: Michael D Kocsmiersky	**ZTEC-018 -PHOTOVOLTAIC PRACTITIONER CERTIFICATE PROGRAM:** This course is designed for Architects, Engineers, Electricians, General Contractors and those interested in developing a career in Photovoltaics. The course instructor, Michael Kocsmiersky, brings many years of experience in the field and guest lecturers from the Utility and PV industry will discuss grid capacity interaction and PV component development. This course will provide a comprehensive coverage of stand alone, utility interactive, and dedicated load applications for solar electricity. Participants will gain a detailed understanding of the types of photovoltaic (PV) cells and modules, the design of various PV Direct Current Source Circuits and their associated power electronics and switchgear. Proper metering of solar production as well as monitoring, storage and data acquisition systems specific to the technology will be reviewed in depth. The course will include sessions on solar resource analysis and modeling site specific production. Several sessions will review structural and mechanical code requirements and best practices for mounting PV arrays. Case studies will illustrate electrical integration into existing buildings and efficient incorporation into new construction. Particular emphasis will be placed on safe installation practices, interconnection requirements, jurisdictional permitting, and utility notifications. The STCC Technology Park 30 kW PV system will be utilized for field demonstration lessons. Two optional Saturday field trips will be scheduled, the first to a PV manufacturing plant and the

	second to a working hybrid residential PV system.
MASSACHUSETTS, West Barnstable **Cape Cod Community College** 2240 Iyannough Road West Barnstable, MA 02668 **Contact:** Valerie Massard, Program Coordinator, Environmental Technology & Clean Energy **E-mail:** 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** 670 West Boylston Street Worcester, MA 01606 **Contact/Instructor:** Mary Knittle **E-mail:** mknittle@qcc.mass.edu **Tele.** (508) 751-7904 **www.qcc.mass.edu** **http://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.
MICHIGAN, Chelsea **Ann Arbor Eletrical 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 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, Iron Mountain **Iron Mountain Kingsford JATC** 205 E. Fleshiem Street Iron Mountain, MI 49801 **Contact:** Sue Nanninga **Email:** suenanninga@yahoo.com **Tele.** (906) 779-1505	**Photovoltaic Seminar (workshop)** Note: These are journeyman level training courses which will be offered only to persons with an extensive amount (4 or more years) of electrical experience. The courses will cover: Loads, site surveys, system sizing, inverter and string sizing, support systems, module testing, mounting, cabling, grounding, hardware, combiner boxes, string OCPD, utility requirements, net metering, commissioning, data acquisition, electrical code, and safety. The NEC requirements will also be covered and some additional hands-on experience. The seminar is based upon different learning stations, in addition to lectures. Each learning station covers specific topics with each participant cycling through each station. The Presenter is experienced in PV and electrical installation and will present material developed by experts in the field. The NJATC Photovoltaic Systems book will be used for reference.
MICHIGAN, New Boston **Power Technology Institute – A Division of the Michigan Institute of Aviation & Technology (MIAT)** 17757 Woodland Drive New Boston, MI 48164 **Contact:** Daniel Ziehm **Email:** dziehm@miat.edu **Tele.** (734) 753-9101	MIAT's Solar Technician program is a two month, 240 hour, comprehensive program designed to provide students with a well rounded balance of theory and hands-on instruction. Students will be guided through the principles of Photovoltaics (PV) as well as in depth instruction on the balance of system components required for a PV system. The students will then plan, design, build, and monitor a functioning PV system. This program was designed using the NABCEP Entry Level Learning Objectives. Upon completion of this program the student will be prepared to take the NABCEP PV Entry Level Exam. Through the close coordination of hands-on applications and theory, the student will be prepared to enter the solar industry at an entry level.
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.
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, support systems, module testing, mounting, cabling, grounding, hardware, combiner boxes, string OCPD, utility requirements, net metering, commissioning, data

Email: tomb@det-ejatc.org **Tele.** (586) 751-6600	acquisition, electrical code, and safety.
MINNESOTA, Cloquet **Fond du Lac Tribal & Community College** 2101 14th St. Cloquet, MN 55720 **Contact**: Kevin Maki **Email:** klmaki@fdltcc.edu **Tele.** (218) 260-5309 **www.fdltcc.edu**	**Entry Level Photovoltaics:** Entry level education in photovoltaic energy to train technicians and prepare them for the NABCEP Entry Level Certificate Exam. In the near future our institution plans to grow our PV program to be able to offer intermediate and advanced training in PV. We offer an AA degree for Electrical Utility Techs, a one year Clean Energy Tech Certificate and we are expanding to develop a 4 year sustainable degree.
MINNESOTA, Duluth **Lake Superior College** 2101 Trinity Rd. Duluth, MN 55811 **Contact/Instructor(s)**: Mary Roe **Email:** mroe@charter.net **Tele.** (218) 260-9920 **www.lsc.cc.mn.us/**	**Entry Level Photovoltaics** Entry level education in photovoltaic energy to train technicians and prepare them for the NABCEP Entry Level Certificate Exam.
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 **Dunwoody College of Technology** w/ Step Up Education 818 Dunwoody Boulevard Minneapolis, MN 55403 **Contact/Instructor(s)**: Mike Anderson, Director of Custom Training **Email:** mikeanderson@dunwoody.edu **Tele.** (612) 381-3097	**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

www.dunwoody.edu	• PV System Mechanical Design • Performance Analysis and Troubleshooting
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, division of Customized Training and Consulting** 317 Marshall Ave St. Paul, MN 55102 **Contact:** Dave Baker, Project Director **Email:** david.baker@saintpaul.edu **Tele.** (651) 846-1583 **Instructor**: Daryl Thayer **http://training.saintpaul.edu**	Entry-level course in Photovoltaic systems and PV Entry Level Exam. This seven (7) day series, 56 hours 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

MISSOURI, Kansas City **Metropolitan Community College** Institute for Workforce Innovation Continuing Professional Education 3201 SW Trafficway Kansas City, MO 64111 **Contact:** Clare Roberts, CPE Programmer **Email:** clare.roberts@mcckc.edu **Tele.** (816) 604-1783 **Instructor**: Tristan Londre www.mcckc.edu	**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, 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.
MONTANA, Missoula **University of Montana – College of Technology** Department of Applied Computing and Electronics 909 South Ave W Missoula, MT 59801 **Contact:** Jenny Gorsegner **Email:** jennifer.gorsegner@umontana.edu **Tele.** (406) 243-7916 **Instructor**: Jeff Wongstrom **www.cte.umt.edu** **http://ace.cte.umt.edu/programs/energy.html**	**NRG295/243 Fundamentals of Photovoltaic Design and 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**. EET111 Basic Electronics and EET112 Basic Electronics Lab, or approved equivalents.
NEVADA, North Las Vegas **College of Southern Nevada** 3200 E. Cheyenne Ave., Sort Code WES North Las Vegas, NV 89030-4228 **Contact/Instructor(s):** Doug Nelson, Program Director **e-mail:** doug.nelson@csn.edu **Tele.** (702) 651-4880 **www.csn.edu**	**BTPV 101B Photovoltaic Fundamentals** This course will give students a fundamental knowledge of Photovoltaic (PV) systems, to include: PV markets and applications, safety, basic electrical, solar energy fundamentals, PV module fundamentals, system components, PV system sizing principles, PV system electrical and mechanical design, performance analysis and maintenance and troubleshooting. *Prerequisite: CONS 130B or Program Director's permission.*

NEVADA, Las Vegas **Southern Nevada Electrical JATC** 62D Legion Way Las Vegas, NV 89110 **Contact/Instructor(s):** Chris Brooks, Robert Buntjer, Guy Snow **e-mail:** 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.
NEVADA – Reno **Northern Nevada Electrical Joint Apprenticeship & Training Committee** 4635 Longley Lane, Suite 108 Reno, NV 89502 **Contact/Instructor(s):** Alan Darney **e-mail** : 401jatc@sbcglobal.net **Tele. (775) 358-4301**	**Solar Photovoltaics I:** This course covers the principals of photovoltaics and how to effectively incorporate PV systems into stand-alone or interconnected electrical systems. The course will discuss system advantages and disadvantages, site evaluation, component operation, system design and sizing, installation requirements and recommended practices. There are hands-on activities associated with many elements of the course.
NEW HAMPSHIRE, Laconia **Lakes Region Community College** 379 Belmont Road Laconia, NH 03246 **Contact/Instructor(s):** Wes Golomb, Mark Weissflog e-mail: wgolomb@ccsnh.edu mweissflog@kwmanagement.com Tele. (603) 524-3207 ext. 763	**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 meetings and two 8-hour days of field work which include a PV installation.
NEW JERSEY, Edison **Middlesex Community College** The Institute for Management & Technical Development 2600 Woodbridge Ave, Edison, NJ, 08818 **Contact:** Patricia Moran, Director **E-mail:** pmoran@middlesexcc.edu **Tele.** (732) 906-4681	This 32-hour course will cover the current financial incentives governing the installation of solar electric systems provided by the Renewable Energy Incentive Plan (REIP) of NJ. Renewable energy projects planned for NJ, Renewable vs. Alternate energy, are all components of typical systems for residential and commercial projects and application process will be covered. In addition, an *8 KW Hybrid System* will be analyzed going through every component and how it works within the system including: Solar Panels, Charge Controllers, Battery backups, invertors, generators, and grid tie connection. Numerous pictorial reviews of residential and commercial installations will be incorporated showing the structural mounts, racking systems, connections, installation of components, roof and ground mount arrays. Basic series and parallel connections of electrical theory will also be reviewed. Call 732-906-4681 for course schedule, fees, and information.
NEW JERSEY, Lincroft	**Solar Energy: Entry Level Photovoltaic Systems** New Jersey ranks second (after California) in solar installations, according to the Solar Energy Industries

Brookdale Community College Outreach, Business and Community Development 765 Newman Springs Road Lincroft, NJ 07738 **Contact:** Mary Ann Waclawik, Program Administrator **E-mail:** mwaclawik@brookdalecc.edu **Tele.** (732) 224-2508 www.brookdalecc.edu	Association. Learn the fundamentals of solar energy and prepare for an entry level position in the photovoltaic industry. This 40-hour course covers the basic technology and the skills required for the design and installation of a photovoltaic energy system. ***Information at*** http://www.brookdalecc.edu/pages/3805.asp 5 SESSIONS.
NEW JERSEY, Mays Landing **Atlantic Cape Community College** 5100 Black Horse Pike Mays Landing, NJ 08330 **Contact:** Jean McAlister, Associate Dean of CE **E-mail:** mcaliste@atlantic.edu **Tele.** (609) 343-5688 **www.atlantic.edu**	**Course description pending.**
NEW JERSEY, Paramus **Bergen Community College** Division of Continuing Education 400 Paramus Road, Tec-115 Paramus, NJ 07652 **Contact:** Ria Bloss, Program Supervisor **E-mail:** rbloss@bergen.edu **Tele.** (201) 447-7466 www.bergen.edu/continuinged	Bergen Community College is the first provider of the NABCEP Entry Level Exam in Northern New Jersey. The 45 hour course teaches the technology and skills required for the design, installation and performance testing of residential and commercial solar systems. It covers in detail all applicable Electrical and UCC code requirements with emphasis on Federal, State and utilities incentives.
NEW JERSEY, Tinton Falls **Warshauer Electric Supply** 800 Shrewsbury Avenue Tinton Falls, NJ 07724 **Contact:** Kennie Marie Fried, Marketing Coordinator **E-mail:** kmf@warshauer.com **Tele.** (732) 741-6400 **www.warshauer.com**	**Introduction to Photovoltaic Systems** In this course, we will look at the 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 MEXICO – Albuquerque **Central New Mexico Community College** 5600 Eagle Rock Ave. Albuquerque, NM 87113 **Contact**: Evelyn Dow Simpson Associate Director, Workforce Training Center **e-mail:** 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 completion of Module 1 and 2 will prepare the student to sit for the entry level NABCEP* exam for Solar PV Systems.
NEW MEXICO – Santa Fe **Santa Fe Community College** 6401 Richards Ave. Santa Fe, NM 87508 **Contact Director of Workforce Development**: Randy Grissom **e-mail:** randy.grissom@sfcc.edu **Tele.** (505) 428-1641 **www.sfccnm.edu** ***Santa Fe Community College also offers a 23 credit hour Solar Energy Certificate Series, the outline of which is given below. The completion of ENVR 221 allows a student to take the NABCEP Entry Level Exam*** This certificate provides students with the skills required to design, plan, install and troubleshoot photovoltaic solar electric energy systems. The certificate will also include a foundation in AC and DC electricity, grid tie applications, and an introduction to solar thermal systems. Students will acquire skills needed to seek entry- and mid-level positions within the solar industry or apply solar energy skills and knowledge to the green building sector. ***Core Requirements (23 credit hours)*** **ENVR 112** Introduction to Sustainable Energy Technologies **ENVR 113** Instrumentation and Controls Lab **ENVR 122** Energy Efficiency and Management **ENVR 114L** Electrical and Mechanical Fundamentals **ENVR 221 Design and Installation of Photovoltaic SystemsI** *NABCEP Entry Level Exam offered after completion of this course* **ENVR 222** Design and Installation of Photovoltaic Systems II **ENVR 225** Design and Installation of Solar Hot Water Systems	Non-credit Solar Theory and Installation Series: (4-day series – NABCEP approved) *** 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. conventional power; application; electrical energy production; wind farms; solar electrical power plants; work possibilities in the field. **Date: May 2, 2009** *** Theory and Application of Solar/Wind Technology:** Topics include: electrical theory; AC/DC; volts; amps; amp-hours; types and design of PV systems; stand-alone systems; grid-tie systems with batteries; components; solar panels; wind generators; water generators; racks; tracking devices; charge controllers; inverters; net metering. **Date: May 9, 2009** *** System Installation and Troubleshooting:** Topics include: demand and load calculations; system sizing and layout; choosing components by size and brand; National Electrical Code (NEC); local and state code; cable and conductor types and identification; wire sizing formulas; assembly of a simple generic PV system from a solar panel to charge controller to battery bank and inverter with appropriate disconnects; system failure troubleshooting; and a tour of the 800-watt grid-tied PV system at SFCC. **Date: May 16, 2009** **System Demonstration and Analysis** **Date: May 23, 2009** Field Trip to several different types of Photovoltaic installations for demonstration and analysis of different systems.

ENVR 227 National Electrical Code	
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 **e-mail:** maciast@wnmu.edu **Tele.** (575) 538-6301	**Pending Course Description**
NEW YORK, Binghamton **Broome Community College** Continuing Education PO Box 1017 Binghamton, NY 13902 **Contact**: Janet M. Hertzog, Director of Workforce Development **Email:** hertzogjm@sunybroome.edu **Tele.** (607) 778-5203 **http://www.sunybroome.edu**	**Photovoltaic (PV) Installation Basics** Learn the basics on installing a photovoltaic (PV) system, including how to site and design the system. Topics include: • How to size a system for both grid connected an off-grid systems • Solar resources • Problems associated with shading and best orientation and tilt for PV arrays • Basic sizing and design of systems to serve a specific electrical load • Safety procedures for installers and study of the electrical code • Various mounting systems for PV arrays and their affects on roofs The class concludes with the installation of a PV system. An optional textbook is available at the BCC Bookstore. Prerequisite: must have a high school diploma, be able to do simple arithmetic calculations, and have a basic understanding of electricity including familiarity with volts, amps, and AC wiring. Instructor: **Dr. Gay E. Canough**, NABCEP certified PV installer and ISP certified Master Trainer.
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 **http://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.
NEW YORK, Copiague **Electrical Training Center, Inc.**	**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

65 Elm Street Copiague, NY 11726 **Contact**: Salvatore Ferrara **Instructor:** Jerry Flaherty **Email:** sal@electricaltrainingcenterLI.com **Tele.** (631) 226-8021	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 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
NEW YORK, Delhi **SUNY Delhi** 146 Bush Hall 2 Main Street Delhi, NY 13753 www.delhi.edu **Contact**: Glenda Roberts, Director, Business & Comm. Services **Email:** robertgv@delhi.edu **Tele.** (607) 746-4548	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 • Safety issues • Battery safety • Hands-on experience installing a grid-tied and battery based system
NEW YORK, Elmsford **Southern Westchester BOCES**	**Introduction to PV Technology** A theoretical basis for understanding the function of photovoltaic systems including history of PV, types of

85 Executive Boulevard Elmsford, NY 10523 **Contact**: Harry J. Kaplan, Supervisor **Email:** hkaplan@swboces.org **Tele.** (914) 592-0849	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, Endicott **ETM Solar Works** 300 North Street Endicott, NY 13760 **Contact**: Lori Johnson, Administrative Executive **Email:** info@etmsolar.com **Tele.** (607) 785-6499 www.etmsolar.com	**Photovoltaics (PV) Installer's Course** In this course, we will look at the 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 electrical code for PV systems in some detail. We will study various mounting systems for PV arrays and how they affect roofs. We will install a PV system. *This course can be applied toward your NABCEP prerequisites.*
NEW YORK, Farmingdale **Farmingdale State University of New York** 2350 Broadhollow Road Farmingdale, NY 11735 **Contact/Instructor**: Prof. Y. Dathatri, Dr. Gay E. Canough **Email:** dathatyn@farmingdale.edu gec@etmsolar.com **Tele.** (631) 420-2450	**Design, Installation and Maintenance of Grid Connected PV Systems:** Offering: *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 – Goshen **Orange-Ulster BOCES** Adult Continuing Education 53 Gibson Road Goshen, NY 10924 **Contact Person**: Ruth Hurd, Vocational Literacy Lead Teacher **e-mail:** rhurd@ouboces.org **Tele.** (845) 781-6715 x10821 **www.ouboces.org**	**PV Installer's Course:** In this course, students will develop the knowledge and practical skills needed to install utility-connected and off-grid 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 Introduction to PV Technology or equivalent course with instructor approval.
NEW YORK – Kingston **SUNY Ulster** Business Resource Center One Development Court Kingston, NY 12401	**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

Contact Program Coordinator: Barbara Reer **e-mail:** ReerB@sunyulster.edu **Tele.** (845) 802-7171 **www.sunyulster.edu**	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.
NEW YORK, Latham **Tri-City Joint Apprenticeship Training & Committee** 428 Old Niskayuna Road Latham, NY 12110 **Contact/Instructor(s):** Richard Cataldo, Ed Knott **email:** trick@nycap.rr.com **Tele.** (518) 785-5167	**Photovoltaic Systems:** Traditional classroom and hands-on learning.
NEW YORK, Liberty **Sullivan County Board of Cooperative Educational Services (BOCES)** 6 Wierk Ave. Liberty, NY 12754 **Contact:** Pamela Rourke, Director of Adult and Continuing Education **email:** prourke@scboces.org **Tele.** (845) 791-4070	**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 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 Introduction to PV Technology or equivalent course with instructor Approval (**40 hrs – 24 hours and 16 hours lab)
NEW YORK, NYC (Bronx) **Center for Sustainable Energy** **Bronx Community College** City University of New York West 181st Street Bronx, NY 10453 **Contact**: Victor Rajcoomar **e-mail:** victor.rajcoomar@bcc.cuny.edu **Tele.** (718) 289-5100 ext. 5334 **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: For more information, go to www.csebcc.org and click on education programs. • 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 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, Port Ewen	*** Photovoltaic Training for Skilled Tradespeople:** This course is designed to train

Ulster County BOCES P.O. Box 601 Route 9W Port Ewen, NY 12466 **Contact:** Virginia Carrig **e-mail:** vcarrig@ulsterboces.org **Tele.** (845) 331-5050 ext 2220 or 2209	electrical contractors and other skilled trades' people in solar PV installation and repair for residential and commercial use. This hands-on course will focus on PV theory, design, installation and troubleshooting. Prerequisite: A complete understanding of AC/DC theory. (40 hrs, 26 lecture, 14 at an actual job site) *** Introduction to PV 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 a student 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. (40 hrs, 24 lecture, 16 lab) *** PV Installer Course:** In this course, students will develop the knowledge and practical skills needed to install utility-connected and off-grid PV systems. Study of electrical 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. (40 hrs, 24 lecture, 16 lab)
NEW YORK, Syracuse **SUNY College of Environmental Science and Forestry (SUNY-ESF)** 221 Marshall Hall 1 Forestry Drive Syracuse, NY 13210 **Contact:** Maura Harling Stefl, Program Specialist **Tele.** (315) 470-6889 **Email:** mhstefl@esf.edu **www.esf.edu/outreach**	**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.
NEW YORK, Troy **Hudson Valley Community College** 80 Vandenburgh Avenue HVCC – HRC 450 East Troy, NY 12180 **Contact/Instructor(s)**: Marlene J. LaTerra, Coordinator, Workforce Development Institute **e-mail**: m.laterra@hvcc.edu **Tele.** (518) 629-4238	**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)** ********** Note: contact **Workforce Development** to register for the following course: (518) 629-7338 or (518) 629-4827. **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 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) 629-7338 or (518) 629-4827.
NEW YORK, Watertown **Electrical JATC of Watertown, NY** 25001 Water Street Watertown, NY 13601 **Contact:** Bruce Rosbrook, Training Director **E-mail**: brosbrook@ibew910.org **Tele.** (315) 782-1675 www.ejatcofwatertown.org	**Pending Course Description**
NEW YORK, Wellsville **Alfred State College** 2530 S. Brooklyn Ave Wellsville, NY 14985 **Contact:** Craig Clark	**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

E-mail: clarkcr@alfredstate.edu **Tele.** (607) 587-3101 www.alfredstate.edu	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, White Plains **Pace University** One Martine Avenue Suite 424 White Plains, NY 10606 **Contact:** Sylvia Russakoff, Director Pace University Computer Learning Center **E-mail**: srussakoff@pace.edu **Tele.** (914) 422-4328 www.pace.edu/pace/ www.pclc.pace.edu/pclc/solar.htm	**Pending Course Description**
NEW YORK, Yorktown Heights **Putnam/North Westchester BOCES** 200 BOCES Drive Yorktown Heights, NY, 10598-4399 **Contact:** Alyson Kistinger, Coordinator of Adult & Continuing Education **E-mail**: 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.*
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.
NORTH CAROLINA, Charlotte **Central Piedmont Community College** Department of Geomatics & Sustainability	**ALT 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.

PO Box 35009 Charlotte, NC, 28235-5009 **Contact:** Ernie McLaney, Program Coordinator **email:** ernie.mclaney@cpcc.edu **Tele.** (704) 330-6427	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. **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 **Charlotte Electrical JATC** Apprenticeship / Continuing Education 4324 Barringer Dr., Suite 105 Charlotte, NC, 28217 **Contact:** Jason Schumm, Instructor **email:** jsjatc@gmail.com **Tele.** (704) 523-5001 www.charlottejatc.org	**Photovoltaic Systems** The course length is 40 hours total. The course will follow the NJATC Photovoltaic System outline and use its associated text and workbook. It will consist of a combination of lab, lecture, and lesson assignments from the workbook. The course outline is as follows: Intro to Photovoltaic Systems, Fundamentals of Solar Radiation, Solar Radiation Data and Measurements, Site Surveys and Planning, Photovoltaic Systems and Components, Fundamentals of Photovoltaic Devices, Photovoltaic Modules and Arrays, Inverters, Electrical Integration I, and Utility Interconnection.
NORTH CAROLINA, Durham **Durham Technical Community College** Continuing Education Department 1637 Lawson Street Durham, NC, 27703 **Contact:** Jacequeline Mitchell, Continuing Education Program Coordinator **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 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 Training Institute** 16375A Cranlyn Road #121 Huntersville, NC 28078	**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.

Contact: Jon Boggiano, Director **email:** Jon@everblueenergy.com **Tele.** (704) 996-8565 **www.everblue.edu**	
NORTH CAROLINA, Jamestown **Guilford Technical Community College** PO Box 309 Jamestown, NC 27282 **Contact:** Adrian Wright, Department Chair **email:** alwright@gtcc.edu **Tele.** (336) 334-4822 **www.gtcc.edu**	**Course description pending**
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.
NORTH CAROLINA, Raleigh **North Carolina Solar Center** North Carolina State University Campus Box 7401 Raleigh, NC 27695 **Contact/Instructor(s):** Maria O'Farrell **e-mail**: maria_ofarrell@ncsu.edu **Tele.** (919) 513-0775	**REPV: Renewable Electric Generation with Photovoltaics** • ***REPV(E): Electricity Basics and Technology of Photovoltaic Systems*** • ***REPV(B): Business Basics and Technology of Photovoltaic Systems**** The weeklong photovoltaics workshop has two variations. To earn your RET Diploma, you must only take one or the other. REPV(E) begins the workshop with the basics of electricity. This workshop is ideal for those who need a refresher course on electrical concepts. PV(B) concludes with presentations on popular financing mechanisms for solar, utilizing available financial analysis tools and calculating payback. The last four days of PV(E) and first four days of PV(B) workshop is dedicated to the technical aspect of photovoltaics, including a hands-on day and an optional NABCEP Entry-Level Exam. **NOTE: To take the business version - PV(B) - of the photovoltaics class, we require that you have gone through the basics of electricity class from REW, or*

	have an electrical background. It is important that students who take the PV(B) class are already comfortable with electricity and electrical safety concepts to satisfactorily follow the curriculum.
OHIO – Centerville **Fortis College** 555 E. Alex Bell Road Centerville, OH 45459 **Contact:** Terry Farris **e-mail**: tfarris@fortiscollege.edu **Tele.** (937) 433-3410 www.fortiscollege.edu	**PROGRAM DESCRIPTION** 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 foothold to play a part in an exciting and expanding field. In this program, students will learn how photovoltaic systems work and the many ways people are using solar technology around the world to power homes, businesses, telecommunications, communities, and even transportation. With the tools and knowledge gained from this program, students will understand the best uses of photovoltaic energy, know how light energy from the sun can be converted for household use, have a general understanding of PV system components, sizing, and be able to perform basic system analysis and troubleshooting . Successful graduates who complete this program may wish to continue their education and test for certification.
OHIO – Cincinnati **Cincinnati State Technical & Community College** 10100 Reading Rd Campus Cincinnati OH 45241 **Contact/Workforce Development Center Business Manager:** Larry Cherveny **e-mail:** larry.cherveny@cincinnatistate.edu **Tele.** (513) 569-1497 **Cincinnati State Technical & Community College** 3520 Central Parkway Campus Cincinnati, OH 45223 **Contact/Instructor:** Larry Feist **e-mail**: larry.feist@cincinnatistate.edu **Cincinnatistate.edu**	• **Electronic Devices: Renewable Energy Systems**: (40 contact hours/ 3 credit hours) An overview of electronic devices used in renewable energy systems. Topics include binary circuits, analog to digital and digital to analog conversion, magnetic, generators, batteries, power efficiencies, and data collection programming. • **Photovoltaic Systems:** (40 contact hours/ 2 credit hours) An overview of solar photovoltaic systems. Topics include PV applications, solar electric fundamentals, system components, sizing systems, system designs, performance analysis and troubleshooting, along with hands-on system installation. **Both classes are instructor led with approximately half lecture and half lab.**
OHIO – Columbus **Columbus State Community College** Department of Automotive & Applied Technologies	This course covers fundamentals of PV systems and equipment, and code-compliant installation requirements for residential and commercial installations. Lesson plans in the workbook parallel chapters in the text and provide an overview of curriculum materials including course textbook, student workbook, lab manual instructor guide and presentation materials. The course format includes classroom

550 E. Spring Street, Columbus, OH 43081 **Contact:** J.D. White, Program Coordinator **e-mail**: jwhite02@cscc.edu **Tele.** (614) 287-5211 www.cscc.edu	instruction and hands-on interactive lab exercises using state of the art equipment and materials. Sample lab exercises cover variations on equipment and procedures that are used to meet learning objectives. Emphasis is also placed on how to achieve nationally recognized credentials.
OHIO – Dayton **Sinclair Community College** Architecture Technology 444 West Third Street Dayton, OH 45402 **Contact:** Robert Gilbert, Professor of Architecture and Technical Director **e-mail**: 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 – Marietta **Washington State Community College** Green Academy - Workforce Development 710 Colegate Drive Marietta, OH 45750 **Contact:** Tina M. Trombley, Green Academy Project Manager **e-mail**: ttrombley@wscc.edu **Tele.** (740) 568-1943 www.workforce.wscc.edu/green	**Entry Level Photovoltaic System Installation Class.** This five-day (40-hour) training will give students a comprehensive understanding of the technology and skills required for the design and installation of **solar photovoltaic systems** (include three days classroom instruction and two days of actual installation) taught by experts in this field. WSCC is an accredited institution, and the course is designed around the NABCEP Learning Objectives (application, design, installation and operation of grid-tied and stand-alone PV systems) to prepare students for the NABCEP PV Entry Level Exam for which WSCC is a registered provider. Register or learn more at www.workforce.wscc.edu/green.
OHIO – Nelsonville **Hocking College** 3301 Hocking Parkway Nelsonville, OH 45764 **Contact:** Jerrold Hutton **e-mail**: hutton_j@hocking.edu **Tele.** (740) 753-7035	**Entry Level Photovoltaic System Installation Training Course**: This 5 day (40 hour) workshop includes 3 days classroom instruction and 2 days of actual installation work. You can also earn 1 college credit.
OHIO – Nelsonville	**Introduction to Solar Power:** Traditional classroom with hands-on experience in a lab setting. We also have

Tri-County Career Center 15676 State Route 691 Nelsonville, OH 45764 **Contact/Instructor(s):** Dave Gehlauf **e-mail** : tj-dgehlauf@seovec.org **Tele. (740) 753-3511**	access to two working solar installations at Hocking College in Nelsonville, Ohio.
OHIO – Piqua **Upper Valley Joint Vocational School** 8901 Looney Road Piqua, OH 45356 **Contact/Instructor(s)**: Art Bowser **e-mail:** bowsera@uvjvs.org **Tele.** (937) 778-8419 **www.uvjvs.org**	**Pending Course Description**
OHIO – Toledo **Owens Community College** Tracy Road P.O. Box 10,000 Toledo, OH 43699-1947 **Contact/Instructor(s)**: Joe Peschel, John Witte **e-mail:** 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– Toledo **Oregon Career & Technology Center-Department of Adult Education & Workforce Development** 2424 Seaman Street Toledo, OH, 43605 **Contact/Instructor**: Sandra Stroshine **E-mail:** ore_aca_sst@nwoca.org **Tele.** (419) 697-3450 **www.oregonctc.org**	**Green Energy, Electrical & Environmental Specialist** This is a 21 week hands-on course for those wishing to gain employment in the installation field of Photovoltaics, Small & Medium Size Wind Turbines and Geothermal Systems. The course includes the following topics; Solar Heat & Electric Systems, Small & Medium Wind Systems, Alternative Fuels, Geothermal Systems, LEED Rating System, Green Building Materials, Green Building Construction, Green Building Mechanical Systems, Environmental Science, Basic Electricity, Basic Math, 10 Hr. General Industry OSHA, First Aid/ CPR-AED, 2 Week Job Shadow. Participants will be eligible to sit for the NABCEP Entry Level Exam and the Green Mechanical Certification Exam from HVAC Excellence.

OHIO – Cleveland **Cuyahoga Community College** **Workforce and Economic Development Division** 2415 Woodland Avenue Cleveland, OH 44115 **Contact:** Emily Amato **E-mail:** emily.amato@tri-c.edu **Tele.** (216) 987-3027 www.tri-c.edu	This 352-hour, 14-credit-hour program provides an overview of the main sources of alternative energy for residential and commercial buildings, as well as a firm technical grounding in residential energy conservation and auditing. Students take a total of five courses to build and apply skills and knowledge in the areas of safety, electrical power, print reading, efficiency, and alternative energy. In addition to their certificate from Cuyahoga Community College, the program will allow students to obtain three nationally-recognized credentials: OSHA 10 for Construction, BPI Building Analyst 1 certification, and the NABCEP Entry-Level exam.
OREGON – Bend **Central Oregon Community College** Continuing Education Dept. 2600 NW College Way Bend, OR 97701 **Contact:** Nancy Jumper, Business & Employee Development **E-mail:** njumper@cocc.edu **Tele.** (541) 383-7273 **http://noncredit.cocc.edu**	**PV for Electricians:** A two-day (approx. 16 hour) course for electricians with existing knowledge to prepare for the NABCEP PV Entry Level exam. Not intended for those without prior electrical background. A future, 45 hour class is planned for those with no prior PV solar experience.
OREGON – Central Point **Crater Lake Electrical JATC** 4864 Airway Drive Central Point, OR 97502 **Contact:** Claire Lizana, Training Director **E-mail:** clejatc2@clearwire.net **Tele.** (541) 773-5888 **http://clejatc.clearwire.net/**	This course covers all of the basic requirements for system installations: • OSHA Safety/Fall Protection • System Design • Mechanical & Electrical Design • Site Assessment • Equipment • Maintenance and Troubleshooting This 24 hour course is presented in three 8 hour sessions. In addition to classroom training, it also includes field training in solar site assessment and hands on training assembling a 1kW Grid Tie Photovoltaic system. At the completion of this course, students have the opportunity to sit for the NABCEP Entry Level exam. This course is also registered with the Building Codes Division of the State of Oregon for 24 hours of continuing education credits.

OREGON - Eugene **Lane Community College** Science/Energy Programs 4000 East 30th Avenue Eugene, OR 97405 **Contact/Instructor(s):** Roger Ebbage, Ryan Mayfield **e-mail:** ryan_mayfield@earthlink.net **Tele.** (541) 463-3977	**Photovoltaic Design & Installation, I, II and III** are offered. 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 North American Board of Certified Energy Practitioners (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, 60-question exam that will be administered at the end of the course. Due to the fast paced nature of the course, the registration is limited to 30 students.
OREGON – Portland **NECA-IBEW Electrical Training Center (NIETC)** 16021 NE Airport Way Portland, OR 97230 **Contact/Instructor**: Brian L. Crise **e-mail:** bcrise@nietc.org **Tele.** (503) 501-5054	**Photovoltaic Basics:** An entry-level course designed to provide the electrician basic information about PV systems, general operating principles, installation methods of system components and applicable codes. This includes information for taking the NABCEP Entry Level exam. The NABCEP Entry Level Certificate or their Installer Certification are not required for installers of photovoltaic equipment in Oregon and Washington. (16 hours)
OREGON – Tangent **Central Electrical Joint Apprenticeship Training Committee (JATC)** 33309 Hwy 99E Tangent, OR 97389 **Contact/Instructor**: Greg Creal **e-mail:** 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 - Allentown **IBEW Local 375 JATC** 1201 W. Liberty St. Allentown, PA 18102-2651 **Contact:** Paul Anthony, Training Director **e-mail:** ibew375td@ptd.net **Tele.** (610) 432-9762	**Photovoltaic (PV) System Installer Course** covers the design and installation of photovoltaic systems. Topics covered: theory, cost analysis, site surveys, code compliance, different types of systems, charge controllers, inverters, batteries, mechanical integration, electrical integration, utility interconnection, safety, permitting, inspections, commissioning, maintenance, and troubleshooting. Hands-on training is provided on site, at the training center. Upon successful completion of the course, the NABCEP Entry Level exam will be offered.
PENNSYLVANIA - Bethlehem **Northampton Community College** Department of Business and Technology 3835 Green Pont Road Bethlehem, PA 18020 **Contact:** Jack Schreiber, Assistant Director, Technical Programs **e-mail:** JSchreiber@northampton.edu **Tele.** (610) 332-6260 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 North American Board of Certified Energy Practitioners (NABCEP) PV Entry Level exam.
PENNSYLVANIA – Blue Bell **Montgomery County Community College** 340 Dekalb Pike Blue Bell, PA 19422 **Contact:** Joan Branch, Coordinator, Professional Development Programs **e-mail:** jbranch@mc3.edu **Tele.** (215) 619-7331 **www.mc3.edu**	**Introduction to Solar Installation** This 45-hour course will provide traditional classroom and hands-on training for students interested in a career in the solar industry. The course will introduce functions and fundamentals of the photovoltaic industry which includes maintenance, installation and planning. Areas covered will be electricity and the distribution and transmission of electric power. The following course outline will be utilized: - Job site safety (OSHA) - Solar markets and applications - Fundamentals of solar energy - Math basics - Electricity basics - Solar module fundamentals - System components and sizing - Mechanical design - Electrical design - -Performing system check, maintenance, and trouble shooting - Hands-on training: Lab will consist of measuring and testing, connecting modules, site survey, use of tools, and building systems.
PENNSYLVANIA – Harleysville **Associated Builders and Contractors South Eastern Pennsylvania Chapter** 1500 Gehman Road	**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

Harleysville, PA 19438 **Contact:** William Henry, Director of Craft Training **e-mail:** bhenry@abcsepa.org **Tele.** (215) 256-7976 **www.hacc.edu**	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. Harrisburg, PA 17110 **Contact:** Cheryl Deitz, WFD Coordinator **e-mail:** chdeitz@hacc.edu **Tele.** (717) 221-1338 **Fax:** (717) 909-4014 **www.hacc.edu**	**Solar Photovoltaic (PV) Electric Systems** Learn the fundamentals of PV system design and installation in one of either a 40- or 60-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 content follow NABCEP's learning objectives for the entry level exam. Topics include: • PV markets and applications • Electricity and safety basics • PV module fundamentals • Hands-on solar workshop • PV system components and sizing • PV mechanical and electrical design • Performance analysis and troubleshooting • Conservation and efficiency practices • Course review and test prep The optional NABCEP Entry Level PV Exam will be offered at the end of each course. Designed for builders, electricians, architects, code officials, construction- and energy-related business owners, teachers, attorneys, and elected officials.
PENNSYLVANIA - Philadelphia **Apprentice Training for the Electrical Industry Local 98 IBEW** 1719 Spring Garden St. Philadelphia, PA 19130 **Contact:** Michael Neill, Training Director **e-mail:** mneill@ibew98.org **Tele.** (215) 567-6405 www.IBEW98.org	**Pending Course Description**
PENNSYLVANIA - Philadelphia **Infinite Solar, Inc** 2880 Comly Rd Philadelphia, PA 19154	**5 Day Entry Level Solar PV Design and Installation Course**: Traditional classroom with hands on experience (3 days class room and 2 days lab with actual installations). This intensive 40-hour course will give students a comprehensive understanding of photovoltaic systems, their components and integration into the grid. Industry specific Design Software is covered as

Contact: Trisha Zobel, Executive Director **e-mail:** trisha@infinite-solar.com **Tele.** (215) 464-6460 www.solarschoolpa.com	additional tool for successful sales. By the end of the class, students should be able to size a PV system, secure lag bolts into rafters, properly flashing penetrations line, put together a racking system, wire and secure modules, properly wire & ground the PV system to a combiner box, through a roof, bending conduit & bringing it all to a working inverter. The students hook up the system to the utility grid and the meter spins when 10 kw of lights shine on the first known indoor grid tied PV lab on the East Coast. The course is ISPQ Accredited and it is designed around the NABCEP Learning Objectives for the Entry Level Exam.
PENNSYLVANIA – Philadelphia **The Electric Education Center, LLC** 971-A Bristol Pike Bensalem, PA 19020 **Contact:** Rich Van Wert, President and Chief Instructor **e-mail:** richvanwert@aol.com **Tele.** (215) 245-2024	**The 5 Day Photovoltaic Installation and Design** course introduces students to photovoltaic design, both mechanical and electrical, PV system installation and maintenance. It follows Jim Dunlop's Photovoltaic Systems textbook. The course consists of a total of 40 hours – a mix of instructor-led traditional classroom training and hands-on installation lab training on an indoor roof (variety of vendor products and ballasted system included). This program is geared toward those looking to enter the exciting field of photovoltaic solar – designers, installers, salesmen. Students will be exposed to simulated field conditions and will participate in the construction of a utility interactive photovoltaic system. In addition, the course will prepare students to take the NABCEP Entry Level PV Exam. The 40 hour course is ISPQ/IREC Accredited and is comprised of several learning modules including the 10 NABCEP learning objectives: · 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 The Electric Education Center is a Registered Provider of the NABCEP Entry Level Exam and a Continuing Education Provider for the states of PA, DE, NJ and MD.
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 **e-mail:** ana.cuebas@gmail.com	**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.

Tele. (787) 890-7118, 890-2681, Ext. 264/275/269	
RHODE ISLAND - Warwick **New England Institute of Technology** Department of Electrical Technology 2500 Post Road Warwick, RI, 02886 **Contact:** Thomas Thibodeau, Assistant Provost **e-mail:** 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.
TENNESSEE, Cleveland **Cleveland State Community College** 3535 Adkisson Drive NW PO Box 3570 T101A Cleveland, TN. 37320 **Contact/Instructor(s):** Allan Gentry **E-mail:** 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.
TENNESSEE, Dickson **Tennessee Technology Center at Dickson** 740 Highway 46 Dickson, TN 37055 **Contact:** Mark Powers, Director **E-mail:** mark.powers@ttcdickson.edu **Tele.** (615) 441-6220 **www.ttcdickson.edu**	**Course description pending.**
TENNESSEE, Jackson **Jackson State Community College** 2046 North Parkway Jackson, TN 38301	**Course description pending.**

Contact: Jack Laser, Director, Continuing Education Workforce Development **E-mail:** jlaser@jscc.edu **Tele.** (731) 425-2646 **www.jscc.edu**	
TENNESSEE, Knoxville **Pellissippi State Community College** Business and Community Services PO Box 22990 10915 Hardin Valley Road Cleveland, TN 37320 **Contact:** Brad Coburn, Director, Industrial and Contract Training **E-mail:** bwcoburn@pstcc.edu **Tele.** (865) 694-6666 www.pstcc.edu/bcs	**Solar PV Training Series** **IND 931- Introduction to Solar Photovoltaics** The objective of this course is to provide the entry level photovoltaic installer/technician with fundamental technical knowledge on Photovoltaics in order that the technician may acquire and advance in design, installation and servicing responsibilities as the market for photovoltaic power systems progresses. **prerequisite for IND 932* IND 802-Math for Industry- basic math skills. **prerequisite for IND 932* **may test out in lieu of class* IND 830-Basic Electricity- basic electricity skills. **prerequisite for IND 932* ** may test out in lieu of class* **IND 932-Solar Photovoltaic System Design and Installation** Recognize the various types of photovoltaic systems and components currently in use. Demonstrate safe working practices. Properly design and size residential photovoltaic power systems. Assist in the planning and installation of photovoltaic arrays and components. Understand the types of codes and standards that apply to installation of photovoltaic systems. Improve the quality of installations.
TENNESSEE, McKenzie **Tennessee Technology Center at McKenzie** Electronics and Green Technology 16940 Highland Drive McKenzie, TN 38201 **Contact:** Bruce Moore, Instructor **E-mail:** bruce.moore@ttcmckenzie.edu **Tele.** (731) 352-5364 **www.ttcmckenzie.edu**	**Course description pending**
TENNESSEE, Pulaski **Tennessee Technology Center at 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 practical theory, design criteria, installation guidelines, safety issues, and maintenance principles of photovoltaic solar systems.

Contact: James Dixon, Director **E-mail:** james.dixon@ttcpulaski.edu **Tele.** (931) 424-4014 www.ttcpulaski.edu	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 Awards: Certificate & Diploma Program Length: 3 Trimesters
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 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 **Austin Joint Apprenticeship and Training Committee** 4000 Caven Road, Austin, TX **Contact:** Nora Ureste	**Photovoltaic System Design & Installation Workshop** This workshop is offered by Imagine Solar in partnership with the Austin JATC Electrical Training Center. It is an intensive 40-hour hands-on workshop on photovoltaic system design & installation complete with classroom lectures, hands-on labs, and a utility-interactive PV system installation. Our workshop assumes no previous experience. However, it covers advanced material from the

nora.ureste@imaginesolar.com **Tele.** 512.443.5725 **Instructors:** Michael Kuhn: michael.kuhn@imaginesolar.com John Hoffner: John.hoffner@imaginesolar.com Also, Brad Newcomb, Richard Stovall, James E. McElhanon, and T.J. Ramsey www.imaginesolar.com	NABCEP professional-level PV Installer task analysis in addition to the entry-level NABCEP task analysis. Therefore, it is appropriate for the serious non-technical beginner as well as electrical contractors and engineers. 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. Workshop attendees will be provided the textbook titled "Photovoltaic Systems" from American Technical Publishers, Copyright 2007 by National Joint Apprenticeship & Training Committee for the Electrical Industry (NJATC).
TEXAS, El Paso **El Paso Electricians Joint Apprenticeship and Training Committee** 6967 Commerce Ave. El Paso, TX 79915 **Contact**: Michael Waldo, Director **emails:** mwaldo@epjatc.com **Tele.** (915) 872-9927 www.epjatc.com	40 hour course covering the fundamentals, design and installation of solar photovoltaic (PV) systems. It will include actual hands-on work with photovoltaic systems and equipment. It is targeted towards electrical contractors, journeymen, instructors and apprentices wanting to learn more about the installation and technology of PV systems.
TEXAS, Grand Prairie **North Texas Electrical Joint Apprenticeship and Training Center** 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. 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.
TEXAS, San Antonio **Alamo Colleges** 201 W. Sheridan	Alamo Colleges: Solar Photovoltaic (PV) Technician- This 48-hour course provides knowledge and skills required to perform basic tasks involved in placement and connection of solar panels. It prepares participants

San Antonio, TX 78204-1429 **Contact**: Anson Green, Coordinator Work based Solutions **emails:** agreen27@alamo.edu **Tele.** (210) 485-0259	to perform tasks related to configuration, installation, inspection and maintenance of PV systems that meet the performance and reliability needs of the customer. It also prepares them to interpret and comply with applicable codes, standards, and safety requirements. This course prepares participants to take the North American Board of Certified Energy Practitioners (NABCEP) entry level exam for solar technicians. Topics covered in the course include: 1. Solar energy overview 2. Electricity basics covering AC and DC 3. Components of PV systems 4. System sizing 5. Electrical and mechanical design 6. Analysis of performance 7. Maintenance and troubleshooting 8. Job specific occupational safety
TEXAS, Texas State Technical Colleges; Contact Provider for Locations **Ontility** 3403 N Sam Houston W, Suite 300 Houston, TX 77086 **Contact:** John Berry, Director of Training Sales **Tele.** (512)784-6155 **Email:** john.berry@ontility.com **www.ontility.com**	**Solar Installer Training – Solar Electric Systems** The courses follow the ISPQ standards and NABCEP task analysis including recommended safety procedures, system design, electrical code and industry standard practices. The focus is to provide trainees with real life solar site specific knowledge. Hands-on training covers implementing the task analysis in the field with site analysis, mechanical and electrical design based on specific site conditions, site specific safety issues and construction issues using tools and testing equipment, best practice construction skills and specific site code and inspection issues. The 48 hours of instruction includes 40 hrs of classroom lecture, hand-on labs and hands-on installations and 8 hrs of homestudy.
TEXAS, Waco **Texas State Technical College Waco** 3801 Campus Dr. Waco, TX 76705 **Contact**: Sidney G. Bolfing, Department Chairman Energy Center **emails:** Sidney.Bolfing@TSTC.edu **Tele.** (254) 867-3206	**Pending Course Description**
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 and Advanced PV Installation:** 5 week programs each Tues - Thurs 6-9pm. Classes will cover BASIC topics associated with the design and installation of photovoltaic systems. Final project includes installation of a grid tied PV solar system.

VERMONT, Randolph Center **Vermont Technical College** 1 Main Street Randolph Center, VT 05061 **Contact**: Bryan Carroll, Project Manager **Email:** bcarroll@vtc.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.
VIRGINIA- Chesapeake **Tidewater Electrical JATC** 828 Providence Road, Suite A Chesapeake, VA, 23325 **Contact:** Michael Iacobellis, Training Director **Email:** mikei@tidewaterjatc80.com **Tele.** (757) 480-2812 **www.jatc80.com**	**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 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 **IEC Chesapeake Apprenticeship & Training, Inc** **Contact:** Grant Shmelzer **Phone:** (800) 470-3013 **Website:** www.iec-chesapeake.com	**Please refer to IEC Chesapeake's course description under MARYLAND, Odenton**
WASHINGTON, Mt. Vernon **NWJATC** 306 Anderson Road Mt. Vernon, WA 98273 **Contact/Instructor(s):** Ryan Bradt **Email**: broughty@earthlink.net	**Installing Photovoltaic Systems:** Course is split between traditional classroom setting and lab work on a photovoltaic demonstrator.

Tele. (425) 210-9105	
WASHINGTON, Shoreline **Shoreline Community College** 16101 Greenwood Ave. North Science/Math Division Shoreline, WA 98133 **Contact:** Mike Nelson, Director-Solar/Zero Energy Technology Program **Email:** miknelson@shoreline.edu **Tele.** (253) 396-8446 **www.shoreline.edu**	Pending Course Description
WASHINGTON, Tacoma **SW Washington JATC** 3001 S. 36th Street, Suite A Tacoma, WA, 98409 **Contact:** Anthony Lewis, Training Director **Email:** tony@swwaejatc.org **Tele.** (253) 475-2922 **Instructor(s):** Steve Harper, Barry Blackburn **www.swwaejatc.org**	Photovoltaic systems installation class is a twenty four hour class that is covered in three days. The course is presented using a power point presentation with lecture using the Photovoltaic Systems book by the NJATC, and then concludes with hands-on activity using a solar pathfinder for a site assessment followed by an installation of a 1.2 kw photovoltaic system installation. Prior to the first and second class, reading assignments are given in order to cover all necessary materials. During the three days, you will be exposed to all aspects of Photovoltaic, from the basic introduction, site surveys, cells & modules, inverters, permitting, and safety to name a few.
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 journeyman electrician's certification, including a minimum of 10,000 hours of electrical construction experience. Upon successful completion of the NABCEP COK exam, participants will be awarded a Certificate of Completion by the NJATC.

WISCONSIN, Appleton **Fox Valley Technical College** 1825 N. Bluemound Drive Appleton, WI 54912 **Contact**: Patrick Jensen, Electrical/PV Instructor **Email:** jensenp@fvtc.edu **Tele.** (920) 831-4386 **www.fvtc.edu**	**Course description pending**
WISCONSIN, Cleveland **Lakeshore Technical College** 1290 North Avenue Cleveland, WI 53015-1414 **Contact**: Michael Thompson, Assoc. Dean Apprenticeship and Manufacturing **Email:** mike.thompson@gotoltc.edu **Tele.** (920) 639-1238 www.gotoltc.edu	The course is a stand-alone course built around the ten NABCEP entry level PV learning objectives and is designed to be taught with the use of a PV system trainer.
WISCONSIN, Custer **The Midwest Renewable Energy Association (MREA)** 7558 Deer Road Custer, WI 54423 **Contact**: Clay Sterling, Education Director **Email:** Clay@The-MREA.org **Tele.** (715) 592-6595 www.the-mrea.org/	**PV101 – Basic PV** **PV205 – Intermediate PV** **PV301 or PV305 – Advanced PV Design and Installation Lab or Advanced PV1:** Students will attend three separate workshops. Students must complete basic and intermediate PV and then attend a 4 or 5 day advanced PV course. Students will learn all aspects of design, installation, safety, codes and troubleshooting. Total course length is 40 to 56 hours depending upon specific advance class taken. All courses are in-person and include a mixture of lecture and hands-on activities.
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 **www.nwtc.edu** Northeast Wisconsin Technical College offers a *Renewable Energy Solar Certificate program.*	**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 sizing, lead analysis and energy efficiency. (2 credits)
WISCONSIN, Milwaukee	This course is 45 hours based on the Jim Dunlop "Photovoltaic Systems" 2nd Edition. Due to the advanced incorporated course material and State of

JATC Milwaukee and KM Area Continuing Education JATC Continuing Ed 11001 W. Plank Crt. Suite 102 Milwaukee, WI, 53226 **Contact**: John L. Cyr, Continuing Ed Coordinator **Email:** johnlcyr@gmail.com **Tele.** (414) 778-0305 www.jatc-ce.org	Wisconsin mandated electrical licensing, individuals must have attained a State of Wisconsin Journeyman or Master Electricians credential prior to enrollment for this course. Elements of this course include; solar photovoltaic theory, design and installation, system sizing, safety, trouble shooting, site analysis, specifications and selection of hardware. Grid connected application and case studies will be presented. Students will install 4 grid connected cart systems in training lab and 3 top of pole mount fixed system with a total of 48 modules with 6 stringers, subscribing to all applicable National Electrical Code requirements and OSHA 1910 and 1926 CFR's.
WISCONSIN, Milwaukee **Milwaukee Community Service Corps** 1441 N. 7th Street Milwaukee, WI 53205 **Contact**: Chris Litzau **Email:** investinyouth@wi.rr.com **Tele.** (414) 372-9040 www.milwaukeecommunityservicecorps.org	**PV Entry Level Installer 40-hour Classroom Training.** Curriculum based on *Photovoltaics Design and Installation Manual* by SEI, *Photovoltaic Systems* by Jim Dunlop. Course structure includes traditional classroom, field-based and experience-based lab learning opportunities. The Milwaukee Community Service Corps is a registered apprenticeship program. It is also a U.S. DOL-awarded Youthbuild job training program.