REGISTERED PROVIDERS FOR the NABCEP® ENTRY LEVEL PV EXAM

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

There are currently:
16,900+ Students who have passed the NABCEP Entry Level Exam
249 Providers of the PV Entry Level Exam

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

FACILITY/INSTITUTION	COURSE NAME(S)
ALABAMA – Auburn **Smart North America** 570 Devall Drive Suite 303 Auburn, AL 36832 **Contact:** Ruth Page-Nelson **E-mail:** sgna@smartgridnorthamerica.com **Tele.** (800) 764-3085 www.smartgridnorthamerica.com	**Solar Photovoltaics** This course will provide 40 hours of training covering the NABCEP required learning objectives in preparation for the Entry Level Exam. Participants will get hands-on and classroom training. Completion of this course will result in students who are prepared to enter the field and obtain further training and experience needed to become proficient installers.
ALABAMA – Decatur **Calhoun State Community College** Department of Renewable Energy P.O. Box 2216 Decatur, AL 35609-2216 **Contact:** Jerry W. Adams, Director ACECET/Renewable Energy **E-mail:** jadams@calhoun.edu **Tele.** (256) 306-2642 www.calhoun.edu	**REN 115** This course covers basic principles and design of photovoltaic (PV) systems. Upon completion of the course, students should have demonstrated a basic understanding of PV markets and applications, safety basics, electricity basics, solar energy fundamentals, PV module fundamentals, system components, PV system sizing and electrical and mechanical design, and performance analysis, maintenance and troubleshooting. The course prepares the student to take the NABCEP PV Entry Level Exam. Though highly recommended, taking the exam is not a mandatory requirement of the course.
ARIZONA – Flagstaff **Coconino Community College** Community & Corporate Learning 2800 S. Lone Tree Rd. Flagstaff, AZ 86001 **Contact:** Alex Wright **E-mail:** alex.wright@coconino.edu **Tele.** (928) 526-7647	**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,

www.coconino.edu	operation and maintenance.
ARIZONA – Mesa **Arizona State University** College of Technology and Innovation: The Collaboratory 6075 S Williams Campus Loop W Technology Center Room 147 Mesa, AZ 85212 **Contact:** Collaboratory Coordinator **E-mail:** Collaboratory@asu.edu **Tele.** 480-727-1312 **http://collaboratory.asu.edu/home**	**Photovoltaic System Design and Installation** The 40 hour course will provide an overview of the basic PV system design and application. The goal is to provide an understanding of electrical loads and the ability to offset this with solar power. The emphasis will be on utility-connected residential PV systems along with a basic understanding of off-grid systems. Topics: basic electrical principles applied to PV, intro to PV systems, solar radiation, site survey and pre-planning, utility requirements, safety, specialized tools and the National Electric Code. Additional topics: cells, modules, arrays, system sizing, array construction, balance of system part, load analysis, charge controllers, batteries, selection of proper materials, operation and maintenance. Lab exercises include: electrical & site survey tools, module measurements, effects of temperature and shading, and system commissioning. After-class homework assignments will all students to further practice what was learned in class.
ARIZONA – Phoenix **The Refrigeration School Inc.** 4201 East Washington Street Phoenix, AZ 85034 **Contact:** Sherry Jones, Executive Director **E-mail:** sherry.jones@rsiaz.edu **Tele.** (602) 267-4801 **www.refrigerationschool.com** **ONLINE Option**	**Solar Technology (Online)** This program is designed to provide students with basic knowledge of photovoltaic systems (PV), suitable for a supervised, entry level position within the PV industry. This program gives participants a greater understanding of solar technology and the: • Safety Basics • Electricity Basics • Solar Energy Fundamentals • PV Module Fundamentals • System Components • PV System Sizing • PV System Electrical Design • PV System Mechanical Design • Performance Analysis and Troubleshooting **Fundamentals of Solar (Hands-on)** This module provides an overview of photovoltaic (PV) science and an introduction to the fundamentals of solar energy. Through a combination of lecture, problem solving and hands-on lab exercises, students will learn the concepts and processes of photovoltaic systems, including their design and installation. The module covers the scope of solar energy systems conceptual, mechanical and electrical design, with an emphasis on wiring and electrical issues. 100 hours.

ARIZONA – Prescott **Prescott College** Environmental Studies 220 Grove Avenue Prescott, AZ 86301 **Contact:** David Hanna, Instructor **E-mail:** dhanna@prescott.edu **Tele.** (928) 350-2224 **www.prescott.edu**	**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, 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:** Pam Rogers **E-mail: pamr@sdi.edu** **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** 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.
ARIZONA – Tucson **Tucson Electrical Joint Apprenticeship & Training Program** 1949 W. Gardner Lane Tucson, AZ 85705	**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.

Contact: Karen King, Training Director **Email:** tejatp@tucsonelectricaljatp.org **Tele.** (520) 790-4690 **www.tucsonelectricaljatp.org**	
ARIZONA – Yuma **Arizona Western College** PO Box 929 Yuma, AZ 85366-0929 **Contact:** Daniel Barajas, Dean of Career & Technical Education Division **Email:** daniel.barajas@azwestern.edu **Tele.** (928) 344-7769 **www.azwestern.edu**	**Course description pending**
BAHAMAS, Nassau **Bahamas Technical & Vocational Institute** Old Trail Road, PO Box n-4934 Nassau, Bahamas **Contact: Elva Carey** **e-mail:** careye@btvi.edu.bs **Tele.** 242-502-6380 **www.btvi.edu.bs**	**Solar Electric Design Installation & BATTERY BASED FUNDAMENTALS.** This course is designed to provide an overview of the three basic photovoltaic(PV) SYSTEM APPLICATIONS,PRIMARILY FOCUSING ON GRID-DIRECT SYSTEMS.
BRITISH VIRGIN ISLANDS-Paraquita Bay, Tortola **H. Lavity Stoutt Community College** Paraquita Bay, Tottola, British Virgin Islands, VG1120 **Contact/Instructor**: Dana Lewis-Ambrose **e-mail:** dlewis@hlscc.edu.vg **Tele.** 1(284) 852-7035 **www.hlscc.edu.vg/cpd**	**Renewable Energy Training Programme** In response to the recently passed Energy Policy by the Government of the Virgin Islands in 2013, the H. Lavity Stoutt Community College provides training through a Renewable Energy Training Programme with the following objective or goal in mind: "To train and certify practitioners in the fields of construction, architecture, and electrical installation with the skills to install photovoltaic systems in support of the reduction and usage of traditional power generation methods."
CALIFORNIA	**Entry Level Solar PV Design & Installation**

Sean White Solar IREC/ISPQ Independent Master Trainer **Contact/Instructor**: Sean White **e-mail:** sean@pvstudent.com **Tele.** (925) 482-4176	This course follows the NABCEP Entry Level Learning Objectives in order while at the same time covers every task in the NABCEP PV Installer Job Task Analysis (JTA). Additionally, there is a good deal of hands-on PV Installation. Also, we will connect to and feed the grid with a utility interactive PV System.
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 – Bakersfield **Solar Seminars, Inc.** 4303 E Brundage Lane Bakersfield, CA 93307 **Contact:** Anne Markward, Registrar **e-mail**: anne@solarseminars.org **Tele.** (970) 779-8796	**PV 101: Entry Level Solar Photovoltaic Installation** Using NABCEP's ten learning objectives for the entry level PV installer, PV 101teaches students how to safely and efficiently design, situate, and install a solar electric system. We teach PV 101 in two different formats: either a traditional 5-day, classroom and practice based environment, or a blended format that combines the best of on-line, interactive learning with two days (16 hours) of hands-on installation experience.

www.solarseminars.org	
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 – 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.com** **ONLINE Option**	**Entry Level PV Program –** Sun Pirate's Entry Level PV Program consists of our IREC accredited, self-paced Photovoltaic System Design and Installation Online Course (60 contact hours), and our Electrical and Safety Basics for Solar Installers Online Course. Students will receive instruction in solar electrical theory, working safely with PV, basic load analysis, system sizing, components, and installation and design practices. These courses are aligned with the 10 NABCEP Entry Level Learning Objectives. Upon completion of these courses, student can sit and take the NABCEP Entry Level PV Exam at a Computer Based Center authorized by NABCEP.

CALIFORNIA – Eureka **College of the Redwoods** Dept.: Applied Technology 7351 Tompkins Hill Rd. Eureka, CA 95501 **Contact:** Julia Morrison **e-mail**: julia-morrison@redwoods.edu **Tele. (**707) 269-4005 **www.redwoods.edu**	A course designed to provide students with essential information and training to work with residential solar photovoltaic systems. Course content includes fundamentals of AC/DC, the National Electric Code, and principles of a residential solar photovoltaic systems. Upon successful completion of the course, students will be given the opportunity to take the NABCEP PV Entry Level Exam (North American Board for Certified Energy Practitioners, Inc.) Achievement of the NABCEP PV Entry Level Exam is a way for individuals to demonstrate that they have achieved a basic knowledge of the fundamental principles of the application, design, installation and operation of grid-tied and stand-alone PV Systems.
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 **http://www.solarliving.org/** **ONLINE Option**	**PV 200: PV Design and Installation Intensive**. This dynamic course is an excellent five day intensive workshop that will immerse you in the ever-expanding PV market. This course will prepare you for the NABCEP entry level exam and give you practical hands-on labs to fully understand PV systems. The course covers both on and off grid PV with an emphasis on grid tied residential systems. We take care to cover every aspect of PV design installation; energy efficiency, safety, electricity basics, PV Modules, new PV Technology, Inverters, Mounting Systems, Components (BOS) and Sizing, PV Electrical and Mechanical design, Performance Analysis and Troubleshooting, and Economics of PV. This course is particularly good for those seeking employment in the PV field, but will give the homeowner a great education in PV fundamentals.
CALIFORNIA – Imperial **Imperial Valley College** 380 East Aten Road Imperial, CA 92251-0158 **Contact:** John Fahim **Email:** john.fahim@imperial.edu **Telephone:** 760-336-1310 www.imperial.edu	**IVC Solar PV & Thermal Technician Certificate** This IVC Solar Photovoltaic & Thermal Technician Certificate program has two components and will provide students with adequate knowledge, in class and hands-on, for photovoltaic electrical systems (PV) and solar heating (SH) of water and space systems, which meets the North American Board of Certified Energy Practitioners (NABCEP) standards and learning objectives, including the following courses: Electrical Principles - Electrical Wiring and Protection - Alternative Energies - Solar PV Energy Systems - Solar PV Electrical Systems - Solar Heating - NABCEP Entry Level Exam Preparation - OSHA 30 Hrs card - Internship & Employment Readiness.
CALIFORNIA – Laguna Hills **Allied American University** 22952 Alcalde Drive Laguna Hills, CA 92653 **Contact:** James Parent **Email:** jparent@alliedschools.com **Telephone:** (888) 384-0849 ext.5704	**SOL200: Introduction to Photovoltaic Systems** In this course, students develop trade knowledge of photovoltaic (PV) systems based on the learning objectives for NABCEP PV Entry Level Program. Solar-electric (and other kinds of solar) technologies are introduces, along with the history and current trends in the industry. Applications and benefits of PV are explored, along with the workings of all typical components and methodologies for design of whole systems. Best practices for safety re emphasized throughout, including the use of protective equipment

www.allied.edu	and ways to avoid accidents and minimize workplace hazards.
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 1152 Stealth Street Livermore, CA 94551 **Contact/Instructor(s)**: Michael Hynes, VP of Training and Development **Email:** mhynes@solaruniverse.com **Tele.** (925) 455-4700 www.solaruniverse.com www.sunprotraining.com	**SunPro Tech Solar PV Installer Training** Solar University's SunPro Tech Solar PV Installer training course was designed by trade professionals to turn beginners into solar professionals in a fast and effective learning environment. The intensive immersion style training program is taught in a fully equipped solar installation vocational training facility with hands-on exercises exactly as they are experienced in the field. The SunPro course was designed with the premise that the best way to learn is by doing. During the 5-day SunPro training sessions, students work with experienced instructors to build and operated five different solar power systems. Class sizes are limited to a maximum of 20 students to guarantee the optimum instructor to student ratio throughout the hands-on exercises. The SunPro training session consists of approximately 40% classroom lecture and 60% hands-on field lab work.
CALIFORNIA – Los Angeles **Abram Friedman Occupational Center** 1646 South Olive Street Los Angeles, CA 90015 **Contact:** Jay Wehbe, Instructor **Email:** jmwehbe1@yahoo.com **Tele.** (213) 765-2400 x2505	**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.

www.afoc.edu	
CALIFORNIA – Los Angeles **Coast Career Institute, Inc.** 1345 South Hill Street Los Angeles, CA 90015 **Contact:** Sherry Pruett **Email:** ccisherry@sbcglobal.net **Tele.** (213) 747-6289 **www.coastcareer.com**	**Solar Installation Training:** Our program prepares students for an entry level position for installation of Photovoltaics systems. The course covers core material for photovoltaic principles, system wiring, mounting, system installation, maintenance and trouble shooting.
CALIFORNIA – Los Angeles **East Los Angeles Skills Center** Los Angeles Unified School District 3921 Selig Place Los Angeles, CA 90031 **Contact/Instructor(s)**: Brian Hurd, Bob Bower **Email:** bhhurd@sbcglobal.net **Tele.** (323) 224-5970	**Photovoltaic Installer: Entry Level Exam Preparation:** Participants will receive instruction in solar electrical theory, PV safety, related vocabulary and terminology, types of PV systems, basic load analysis, system sizing, components and hardware, code issues, rebates and incentives, basic cost estimating, net metering laws and employment opportunities in the industry.
CALIFORNIA – Los Angeles **Los Angeles Trade Technical College** 400 West Washington Blvd. Los Angeles, CA 90015 **Contact/Instructor(s)**: Dave Robinson, William Elarton **Email:** cdm@lattc.edu **Tele.** (213) 763-3700 **http://college.lattc.edu/nabcep**	**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:** info@nttisite.com **Tele.** (818) 247-0989	**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,

www.newtechtrain.com	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 – Modesto **Modesto Junior College** Technical Education Department 435 College Ave Modesto, CA, 95350 **Contact:** Andrian DeAngelis, Professor of Electronics Technology **Email:** deangelisa@mjc.edu **Tele.** (209) 575-6088 **www.mjc.edu**	**ELTEC 321: Photovoltaic Systems:** The study of PV systems: off-grid, interconnected and hybrid. The course includes the study of PV systems, positioning, electrical and mechanical design and integration (including hands-on experiences), working safely with PV systems, financial topics (system estimate and rebates) and an overview of NABCEP certification requirements.
CALIFORNIA – Murrieta **Ambassador Energy, Inc.**	**Entry Level Solar PV Design and Installation:** This course is an introduction to PV components, system design, industry codes and standards for PV

24630 Washington Ave. Suite 102 Murrieta, CA 92562 **Contact:** Steve Fulgham **Email:** **info@ambassadorenergy.com** **Tele.** (866) 586-1840 **www.mjc.edu**	system, and unique design problems and solution. Students learn how PV systems operate as well as basic system design and safety practices. The course covers basic electrical terminology, solar fundamentals, detailed discussion of system components, electrical and mechanical design considerations and OSHA safety standards. This course will prepare students for the NABCEP PV Entry Level Exam.
CALIFORNIA – 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 **Tele.** (415) 457-8811 ext. 8108	**ELEC 139 Solar Installation and Integration:** This course is designed as an intro course targeted to entry-level installers with the intent to provide a foundation of skills in trades involved in solar installation. The course is separated into 3 distinct areas: Electrical Theory and Practice, Photovoltaic Theory and Integration, and Building Trade Skills. The program will be a balance of theory, practice and real world examples.
CALIFORNIA – Oakland **Laney College (Peralta Community College District)** 900 Fallon Street Oakland, CA 94607 **Contact:** Stephen T. Weldon, 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	ONE WEEK Entry Level Course for Solar Photovoltaic (PV) Installation & Design. Our specialized course curriculum provides the novice, or the experienced

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**	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 – 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.pasadena.edu**	**Basic PV Design and Installation Program covers:** **Introduction to Photovoltaic Systems:** Intro to PV terminology, concepts, vocabulary, techniques and safety. Application and benefits of different PV systems. PV system sizing and cost estimating. **Photovoltaic Theory and Installation Techniques:** Solar electricity fundamentals, PV safety, site analysis, PV system sizing and design. Product installation, troubleshooting, net metering laws and NEC requirements for PV systems.

CALIFORNIA – Paso Robles **Cuesta College** 2800 Buena Vista Drive Paso Robles, CA 93403 **Contact:** Sabrina Robertson **Email:** sroberts@cuesta.edu **Tele.** (805) 546-3264 www.cuesta.edu	**Intro to Solar Technology/Solar Technology Design & Construction** Intro to Solar Technology introduces basic concepts in solar energy including: the photovotaic industry, solar radiation, & electrical power, site surveying & planning, components of solar systems, cells modules & arrays, batteries, charge controllers & inverters. Solar Technology Design & Construction builds basic concepts from Intro to Solar Tech. Expanded topics include: solar system sizing, mechanical & electrical integration, utility interconnection, permitting & inspection, commissioning, maintenance, troubleshooting & economic analysis.
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 (ENSYS 130):** Course includes site evaluations using the solar pathfinder, photovoltaic module characteristics and specifications, inverter characteristics and specifications, design and installation methods, the NEC related to PV systems. The course includes many hands-on activities setting up Sunny Boy and Xantrex inverters and top-of-pole and tracker configurations. Includes off-grid systems.
CALIFORNIA – Redding **Shasta Builders Exchange** 2985 Innsbruck Drive Redding, CA 96003 **Contact:** Cindy Weaselbear, Education Services Administrator **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 – 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	Students will earn a ***Solar Photovoltaic Installation***

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**	***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 Entry Level exam after these four classes are completed. The capstone class for the entire certificate program is Energy 143 which includes advanced system design and troubleshooting.
CALIFORNIA – San Bernardino **San Bernardino Community College District** 114 S. Del Rosa Drive San Bernardino, CA 92408 **Contact:** Robert Levesque, Workforce Development Manager **Email:** rlevesqu@sbccd.edu **Tele**. (909) 382-4039 **www.SBCCD.edu**	**Photovoltaic Application** • Students will learn about developments in photovoltaic technology and the state of the industry. Solar radiation and its effects and potential, site surveying and preplanning; system components and configuration; cells, modules and arrays; batteries, charge controllers, inverters, systems sizing, mechanical integration, electrical integration, utility interconnection, permitting and inspection, commissioning, maintenance and troubleshooting, economic analysis and NABCEP certification preparation.
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 Director **e-mail:** brichardson@sdett.org **Tele.** (858) 569-6633	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.

www.positivelyelectric.com	
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 Jose **Center for Employment Training (CET)** 701 Vine Street San Jose, CA 95110 **Contact:** Scott Wynn, Green Resource Specialist **E-mail:** swynn@cet2000.org **Tele:** (408) 639-1174	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 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 **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	**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

www.sjcc.edu	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 **SunPower Corporation** 77 Rio Robles San Jose, CA 95134 **Contact:** Training Support **E-mail:** trainingsupport@sunpowercorp.com **Tele:** (800) 786-7693 **www.sunpowercorp.com**	**Fundamentals of Residential Design & Installation** Courses only available to SunPower Dealer Partners Residential Associate Fast Track -or- Fundamentals of Residential Design & Fundamentals of Residential Installation & all online prerequisites for those courses. Visit the SunPower University for more information on these courses.
CALIFORNIA – San Mateo **College of San Mateo** 1700 West Hillsdale Blvd. San Mateo, CA 94402 **Contact/Instructor(s)**: Thomas Diskin **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 Ramon **Laborers Union Training and Retraining Trust Fund for Northern California-San Ramon Training Center** 1001 Westside Drive San Ramon, CA 94583-4098 **Contact**: Jerome Williams, Supervisor of Training **e-mail:** jwilliams@norcalaborers.org **Tele.** (925) 828-2513 http://www.norcalaborers.org/Training/ContactTraining.htm	**Photovoltaic Systems (PV-2)** **Prerequisites: Intro to PV (PV-1), OSHA 10 and out of class study required.** Photovolataic Systems (PV-2) is a comprehensive 70 hour learner focused hands-on course of instruction and includes: PV safety, PV history, markets & applications, solar energy fundamentals, system components, site evaluation, PV system sizing principles, basic system design, mechanical attachments & integration, electrical integration, performance analysis, maintenance & troubleshooting. Successful completion of this course will qualify participants to take the NABCEP PV Entry Level Exam.

CALIFORNIA – Santa Monica **Santa Monica College** 1900 Pico Blvd. Santa Monica, CA 90405 **Contact:** Ruth Casillas **E-mail:** cassillas_ruth@smc.edu **Phone:** (310) 434-4023 **www.smc.edu**	**Introduction to Solar Energy Systems:** Students will gain an understanding of the principles applied to solar photovoltaic and thermal systems. The basic electrical theory and calculations of electrical/capacity requirements for PV systems will be reviewed. Thermal properties, materials, and heat transfer strategies for thermal systems will also be reviewed. Topics will include materials and manufacturing, system components, codes and safe installation procedures. Students will examine the economic, regulatory and infrastructure issues affecting the adoption of solar technologies as well as their potential in solving energy and environmental problems. **Advanced Solar Photovoltaic Systems and Installation.** This competency-based course will prepare students for entry-level employment in the solar photovoltaic (PV) industry and for potential follow-on training in system design. Successful participants will also be qualified to take the NABCEP Entry level exam. Combining theory and hands-on application, this course will include basic electricity, electricity fundamentals in solar PV systems, PV safety, site analysis, PV system sizing and design, components and equipment, product installation, troubleshooting, net metering laws, local codes, and National Electrical Code (NEC) PV requirements.
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 – Sun Valley **East Valley Skill Center**	Photovoltaics 1,2,3 PV1 90 hours Introduction ohms law & PV principles PV2 90 hours hands-on & electrical principles and design.

8603 Arleta Ave Sun Valley, CA 91352 **Contact:** Elizabeth Penuela **E-mail:** epenuela@lausd.net **Tele. (**818) 759-5843 **www.nvoc.org**	PV3 180 hours continuation of PV2 and prep for NABCEP Entry Exam
CALIFORNIA – Sunnyvale **California South Bay University** 1107 N Fair Oaks Ave. Sunnyvale, CA, 94089 **Contact:** Ling Li, Education Administrator Or Sunny Zhang, Education Administrator **E-mail:** ling@csbu.us; sunny@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 – Ukiah **Mendocino College** 1000 Hensley Creek Road Ukiah, CA 95482 **Contact:** Orion walker, Sustainable Technology Program Coordinator **Email:** owalker@mendocino.edu **Tele.** (707) 468-3224 **www.mendocino.edu**	**SST 190 – Introduction to Photovoltaics (Solar)** This course introduces students to the fundamentals of photovoltaic (solar) technology and the process of residential PV system design and installation. This course includes instruction and practice in site evaluation, basic financial analysis, and code compliant PV system design and installation. Students learn the basic concepts and skills needed to work with potential clients and prepare for entry-level employment in the solar PV industry.
CALIFORNIA – Victorville **Victor Valley College**	**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

18422 Bear Valley Road Victorville, CA 92395-5850 **Contact:** Nord Embroden, Program Facilitator **E-mail:** embrodenn@vvc.edu **Tele:** (760) 245-4271 ext. 2246 **www.vvc.edu**	program involves successful completion of five courses prior to receiving a college certificate and sitting for the NABCEP Entry Level exam. **Courses:** CTEV 120 – PV System Design and Installation CT 107 – Technical Mathematics CT 116 – Construction Safety CTMT 122 – Electrical Repair CT 101 – Careers in Construction and Manufacturing
CALIFORNIA – Visalia **College of the Sequoias** Dept. of Industry and Technology 915 S. Mooney Blvd. Visalia, CA, 93277 **Contact:** Larry Dutto, 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.
CANADA – ALBERTA-Vermilion **Lakeland College** 5707 College Drive Vermilion, Alberta, Canada T9X 1K5 **Contact:** Scott Pratt, Electrical Instructor **Tele.** (780) 853-8518 **Email:** scott.pratt@lakelandcollege.ca **www.lakelandcollege.ca**	**PV Design & Field Practices Course:** This is a five day course that provides people in the electrical field a mixture of "hands-on" training and instruction for PV design and installation practices. This course is an introduction to PV components, system design, electrical codes and standards and industry safety practices. This course will prepare students to write the NABCEP PV Entry Level Exam.
CANADA – ONTARIO - Newcastle **College of Renewable Energy** 3377 Lockhart Road Newcastle, Ontario, L1B1L9 Canada **Contact:** Philip Coulter, Dean of Training **Tele.** (905) 987-5475 Email: pecoulter@live.com www.collegeofrenewableenergy.com	**PV Design & Installation Course** A Combination of knowledge and skills are required to design and install PV systems. This 5-Day hands-on PV design & installation course is based on NABCEP learning objectives and prepares participants to challenge the entry level exam. This Course covers system components, site analysis, PV modules, mounting systems, and safety as well as details on the fundamental requirements for implementation of safe, efficient, and code-compliant PV systems. Participants will also learn the basics of sizing an off-grid stand-alone and grid-tied systems, wire sizing, over current protection, and grounding. Maintenance and service procedures round out this course content.

CANADA – ONTARIO – Toronto* **Solar Academy International** Franken Solar 400 Britannia Rd. East, Suite 3 Mississauga, ON L4Z 1X9, Canada **Contact:** Jacob Travis **Tele.** (416) 900-7191 **Email:** Jacob@solaracademy.com www.solaracademy.com ***Additional Training sites in Chicago, IL and San Francisco, 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 – PRINCE EDWARD ISLAND – Charlottetown **Holland College** **Prince of Wales Campus – Centre for Applied Science and Technology** 140 Weymouth St Charlottetown, PE, Canada C1A 4Z1 **Contact:** Blair Arsenault **Tele.** (902) 566-9330 Email: bparsenault@hollandcollege.com **www.hollandcollege.com**	**Energy Systems Engineering Technology** During the two years of this program, students will learn about energy in terms of renewable and energy efficiency. They will learn the theory and well as getting hands-on experiences.
COLORADO - Aurora **Ecotech Institute** 1400 South Abilene Street Aurora, CO 80012 **Contact:** Chris Gorrie **e-mail**: chris.gorrie@ecotechinstitute.com **Tele.** (720) 213-2641 **http://www.ecotechinstitute.com/solar-energy-technology-schools.cfm**	**Solar Energy Technology:** This program is designed to prepare students for careers in the field of renewable energy and focuses on solar energy technologies. Well-equipped campus laboratories and facilities give students the opportunity to apply theory in simulated training environments. Upon completion of the program, graduates should be able to: Demonstrate an understanding of PV Modules and PV System Mechanical and Electrical Design Demonstrate an understanding of industry standards Operate, troubleshoot, maintain and repair photovoltaic systems Apply safety principles Coordinate a job search
COLORADO - Denver	**Installing Photovoltaic Systems:** This 48 hour course

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	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 **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 **Tele.** (303) 853-4886 **www.iecrm.org**	**NABCEP Entry Level** This innovative course will provide students with a thorough overview of Solar Photovoltaic (PV) technology. Specific subjects that will be covered within the coursework include: PV cells, modules, and system components; electrical circuits; PV system design, estimation, and NEC requirements; solar electric products and applications; an understanding of PV equipment and theory. The course will cover all NABCEP Photovoltaic Entry Level PV Systems Learning Objectives and task analysis. Included within the course will be electrical best practices and recommended safety procedures, system design, NEC, and industry standard practices. The course will also provide hands-on training and will cover safety/fall protection, electrical design, structural mounting systems, mechanical/wind load considerations. The NABCEP Job Task Analysis will be the central focus of all hands-on components of the course.
COLORADO - Greeley **Aims Community College** 5401 W. 20th St. Greeley, CO 80634 **Contact:** John Mangin, Chair, Prof. of Construction Management **e-mail**: john-mangin@aims.edu **Tele.** (970) 339-6413 **www.aims.edu**	**ENY 131 Advanced Solar PV** This course teaches advanced principles of a residential photovoltaic system. Additional information will be provided on site evaluation, system design, panel installation, wiring, grounding, bonding and commissioning. Off grid living and systems with battery back-up will also be studied.
COLORADO, Lakewood **Red Rocks Community College** 13300 W. 6th Ave, Lakewood Colorado 80228 **Contact:** Larry Snyder, Coordinator, Renewable Energy Technology; Construction Technology.	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

e-mail: Larry.Snyder@rrcc.edu **Tele. (**303) 914-6306 **www.rrcc.edu**	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, Paonia and Carbondale **Solar Energy International** 39845 Matthews Lane Paonia, CO 81428 **Contact:** Breccia Wilson **e-mail:** breccia@solarenergy.org **Tele.** 970-704-5778 http://www.solarenergy.org/ **ONLINE Option**	***Solar Energy International offers the following training. Our online courses are 6 weeks in length and our in-person workshops, which are 5-6 days in length, are offered all across the country. Check our website for more details. SEI highly recommends that students take PV101 and PV203 before sitting for the Entry Level Exam. SEI students can take the exam at our Paonia, CO facility or through computer-based testing.*** **PV 101 Solar Electric Design and Installation (Grid-Direct):** **This course will provide an overview of the three basic PV system applications, primarily focusing on grid-direct systems. The goal of the course is to create a fundamental understanding of the core concepts necessary to work with all PV systems, including: system components, site analysis, PV module criteria, mounting solutions, safety and commissioning. The course will also cover the basics of sizing a residential grid-direct system, wire sizing, overcurrent protection, and grounding --all of which will be expanded upon in PV202.** **PV202 Grid Direct Design and the NEC: This workshop will build upon the core concepts from PV101 and continue to emphasize grid-direct systems. The course will focus significantly on the National Electrical Code (NEC) , including grid interface calculations, grounding considerations, and advanced component specification. Students will learn to evaluate system performance under various operating conditions. Commercial system design elements, such as inter-row shading, inverter selection, and data monitoring solutions will also be covered. This course combines class lectures with**

	individual problem solving exercises covering common design considerations. **PV203 Battery-Based Design: This course will build upon the core concepts from PV101, with a specific emphasis on battery-based system design. Students will work through step-by-step; design process for battery-based applications, including stand-alone (off-grid), grid-tied with battery back-up, and hybrid systems. Topics such as load analysis, component selection, battery safety, voltage drop, and commissioning procedures will be presented. In addition to sizing exercises and calculations, students will explore additional design and considerations unique to battery-based systems.** ***We also offer five-day intensive lab weeks. Our PV201L Solar Electric Lab Week (Grid-Direct) is designed to follow PV101 or PV203. Our PV201L Solar Electric Lab Week (Battery Based) is designed to follow PV203.***
COLORADO, Rifle **Colorado Mountain College** Integrated Energies Department 3695 Airport Road Rifle, CO 81650 **Contact:** Chris Ellis **E-Mail:** cellis@coloradomtn.edu **Tele.** (970) 625-6935 **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, 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 **IEC of New England, Inc.**	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

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**	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 **Industrial Management and Training Institute** 233 Mill Street Waterbury, CT 06706 **Contact:** Marcel Veronneau, CEO **Email:** mveronneau@imtiusa.com **Tele.** (203) 753-7910 **www.imti.edu**	**Introduction to Solar Photovoltaics** Created for individuals wanting to attain a basic knowledge and application of solar photovoltaic system operations. Based on the ten objectives contained in the NABCEP Entry Level Program, this 45 hour course will cover: • PV Markets and Applications • Safety Basics • Electricity Basics • Solar Energy Fundamentals • PV Module Fundamentals • System Components • PV System Sizing Principles • PV System Electrical Design • PV System Mechanical Design • Performance Analysis, Maintenance and Troubleshooting.
FLORIDA, Cocoa **University of Central Florida** Florida Solar Energy Center 1679 Clearlake Road Cocoa, FL 32922 **Contact:** JoAnn Stirling **Email:** joann@fsec.ucf.edu	**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

Tele. (321) 638-1420 **To register go to:** **www.fsec.ucf.edu and search on "PV course"**	over 25 years.
FLORIDA, Fort Lauderdale **US Solar Institute** 913 NE 4th Avenue Ft. Lauderdale, FL 33304 **Contact:** Ray Johnson, President **Email:** info@ussolarinstitute.com **Tele.** (954) 236-4577 **www.ussolarinstitute.com**	**PV 201 – Introduction to PV System Design & Installation** US Solar Institute offers a diploma program in photovoltaics that is licensed by the Department of Education and our continuing education courses are approved by the Florida Department of Business and Professional Regulation. We offer introductory to advanced solar training courses delivering an educational experience that provides real world knowledge, a solid understanding of solar energy installation and sales, solar contracting and engineering per the National Electric Code, and hands-on field training. USSI trains everyone from solar novices to licensed electricians for a true career in the solar industry.
FLORIDA, Gainesville **Gainesville Electrical JATC** 113 NW 3rd Avenue, #211 Gainesville, FL 32601 **Contact/Instructor:** John Gurski **Email:** John@SullivanSolarPower.com **Tele.** (352) 258-5957 **www.Gainesvillejatc.org**	**Photovoltaic Installation and Design**: this course introduces students to photovoltaic design, both mechanical and electrical. The course follows the PV systems textbook developed by ATP and the NJATC. Each class will also have a hands-on installation project through the IBEW. The course will consist of a total of 48 hours of traditional teaching and 48 hours of hands-on installation training. The course is four-months in duration and is offered twice a year starting in spring/fall.
FLORIDA, Gainesville **Gainesville Job Corps Center** 5301 NE 40th Terrace Gainesville, FL 32609 **Contact/Instructor:** Erick Green, 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	**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

Contact: Thomas A. Moncilovich, Assistant Director **E-mail:** tmoncilovich@browardschools.com **Tele.** (754) 321-5435 **www.sheridantechnical.com**	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, Miami **College of Business & Technology** 8991 SW 107th Avenue Suite 200 Miami, FL 33176 **Contact:** Miguel A. Padilla Caneiro **E-mail:** miguel@cbt.edu **Tele.** (305) 273-4499	**Installing Photovoltaic Systems** This course provides the basic knowledge in relationship with installing, designing and troubleshooting of a photovoltaic system. The students will also gain knowledge pertaining PV articles in the NEC. This course provides the basic knowledge in relationship with installing, designing and troubleshooting of a photovoltaic system. The covered topics include solar radiation, site survey, array orientation, components, systems configurations, system sizing and design, mechanical and electrical installation, utility interconnection, codes regulations, safety practices, maintenance and feasibility analysis.
FLORIDA, Largo **Solar Source Institute** 10840 Endeavour Way Largo, FL 33777 **Contact:** Rick Gilbert, President **Email:** rick@solarsource.net **Tele.** (800) 329-1301 **www.solarsource.net**	With over 25 years of experience, Solar Source developed a training arm to help meet the needs of the growing solar industry. As a result, **Solar Source Institute** (SSI) was established. Since its inception, SSI has trained approximately 500 electricians, plumbers, roofers, architects, building inspectors, technical trainers, and other construction-related workers. SSI training teaches not only fundamentals and installation, but also covers permitting, sales & marketing, financial incentives, and more to assure the students can manage jobs from start to finish. SSI is licensed by the Dept. of Education and is a member of the Florida Association of Post-Secondary Schools and Colleges. SSI courses are approved for continuing education credits by the Florida Department of Business and Professional Regulation for both the Construction Industry Licensing Board (CILB) and the Electrical Contractors Licensing Board (ECLB). SSI is partnered with several State colleges in Florida and

	beyond to offer consistent quality training opportunities in multiple locations.
FLORIDA, Melbourne **Eastern Florida State College** 3865 North Wickham Road Melbourne, FL 32935 **Contact:** Lisa Austin **Email:** austinl@easternflorida.edu **Tele.** 321-433-7081 www.easternflorida.edu	**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. **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, St. Petersburg **Pinellas Technical Education Centers (PTEC)** **St. Petersburg Campus** 901 34th Street South St. Petersburg, FL 33711 **Contact:** Sylvester (Boe) Norwood **Email: norwoods@pcsb.org** **Phone:** (727) 893-2500 **www.myptec.org**	This Florida Dept. of Education (FLDOE) approved 600 hour program consists of two Occupational Completion Points (OCPs). **Solar Photovoltaic Design, Installation and Maintenance Helper** – Course EEV0205 (150 hours) Content includes basic safety, tools of the trade, identification of solar systems and components, environmental impact issues, alternative forms of energy, and employability skills. **Solar Photovoltaic Design Installation and Maintenance Technician** – Course EEV0206 (450 hours) Content includes teamwork, site assessment, blueprint reading and interpretation, basic electricity skills, solar collector installation, electrical wiring, and PV design, installation, maintenance, and troubleshooting.
FLORIDA, Tampa **D.G. Erwin Technical Center** 2010 E. Hillsborough Avenue Tampa, FL 33610 **Contact:** Donna Matassini **Email:** donna.matissini@sdhc.k12.fl.us **Phone:** (813) 231-1829 **http://erwin.edu**	**Solar Photovoltaic System Design, Installation and Maintenance** This program provides students with the technical knowledge and skills needed to adapt a solar photovoltaic design; conduct a site assessment; read blueprints; and install, maintain, and troubleshoot a solar photovoltaic system. Students will learn basic electricity concepts in DC and AC electrical circuits, voltage, and electric codes, as well as practice hands-on basic residential wiring. Solar installation site assessments and design skills will be developed through hand sketches, use of IT Technology and Computer Aided Drafting (CAD) software.

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

Email: koprovence@solairgen.com **Tele.** (706) 867-0678 **www.solairgen.com** **ONLINE Option**	and intensive hands-on PV system installation experience in the Solairgen facility.
GEORGIA, Savannah **Savannah Technical College** **Electrical Construction & Maintenance** 5717 White Bluff Road Savannah, GA 31405 **Contact:** Lester E. Wiggins, Department Head Electrical Construction **Email:** lwiggins@savannahtech.edu **Tele.** (912) 443-5861	**Photovoltaic System Installation:** This course introduces techniques and methods on how to install residential and commercial solar photovoltaic systems. Solar systems include grid-connected, stand alone and hybrid.
HAWAII, Honolulu **Honolulu Community College** 874 Dillingham Boulevard Honolulu, HI 96817 **Contact/Instructor(s)**: Ismelda Agbisit, Program Coordinator **Email:** iagbisit@hawaii.edu **Tele.** (808) 847-9823 **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	**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.

Email: zinner@hawaii.edu **Tele.** (808) 984-3315 **http://maui.hawaii.edu**	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 principles of solar energy, PV modules and how to design a safe, code-compliant PV system. Preparing a PV system design is a key component of the course. Case studies will also be examined. The course provides the skills suitable for a supervised, entry level position in the photovoltaic industry.
HAWAII, Kaneohe **Windward Community College** 45-720 Keaahala Road Kaneohe, HI 96744 **Contact: Preshess Willets-Vaquilar** **Email:** preshess@hawaii.edu **Tele.** (808) 235-7365 http://windwardcce.org/	**Introduction to Photovoltaic Design and Installation** This course is your first step toward building a career as a nationally recognized certified Solar PV Installer or certified PV Technical Salesperson. Basics of electricity, principles of solar irradiance and irradiation, and PV System components/configurations will be covered. Completing this course is required to be eligible to take the NABCEP PV Entry Level exam. A person who passes the exam has demonstrated a basic knowledge of photovoltaic systems, which is an important first step in preparing individuals to become highly skilled, qualified and experienced tradespersons and professionals in the PV industry. ****According to Hawaii law, all electrical work needs to be performed by a licensed electrician.
HAWAII, Kauai **Kauai Community College** 3-1901 Kaumualii Highway Lihue, HI 96766 **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 includes systems that

	are tied to the utility grid as well as systems that stand alone or include storage backup with batteries. Once the right type of equipment is selected we need to know how much is required, where to put it, and how to connect it. This is the key to intelligent PV design. Understanding these principles will be a main focus for the class.
IOWA, Cedar Rapids **Kirkwood Community College** 6301 Kirkwood Blvd. SW Cedar Rapids, IA 52404 **Contact**: David W. Bennett **Email:** david.bennett@kirkwood.edu **Tele.** (319) 398-4983 www.kirkwood.edu	**Photovoltaic System Installer** Covers the use of various tools and techniques for solar electric component operation and connection, system design and sizing, and standard requirements and practices. Studies a range of PV system operations, from fundamentals t0 advanced mechanical and electrical concepts in accordance with the National Electric Code.
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 **www.jalc.edu**	John A. Logan College offers two solar design and installation courses. The Beginning course is an **introduction to photovoltaic systems**, design, and procedures commonly practiced in the photovoltaic industry and trade. The course is primarily intended for those with a construction and construction management background who seek to become skilled photovoltaic installers, electricians, or designers. The **Advanced Solar Design and Installation** course provides detailed instruction in the design and installation of photovoltaic systems with practical, hands-on practice. Those who successfully complete the advanced course will have the knowledge and skill sets required for entry level positions within the renewable energy industry and will be able to converse with solar energy professionals. The final examination for the advanced course is the examination for the **North American Board of Certified Energy Practitioners PV Entry Level Exam.** Contact Aur Beck at tech@aessolar.com.
ILLINOIS, Godfrey **Lewis & Clark Community College** 5800 Godfrey Road (TR145) Godfrey, IL 62035	**Photovoltaics (PV)** This course provides an introduction to the basic principles of PV design, installation guidelines, and safety issues involved with PV power systems.

Contact: Michael Morgan, Associate Professor **Email:** mmorgan@lc.edu **Tele.** (618) 468-4922 **www.lc.edu**	
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 PVEL Exam here at the KCC Testing Center. KCC Solar-PV course meets for 5 hours per week, for 16 weeks and involves traditional classroom lecture sessions, and hands-on experience with real-world PV-system hardware. ELTR2334 was developed by, and is taught by, Tim Wilhelm. Tim has been a RET professional for over 30 years. He is SunWize Technologies' first dealer, he's an early NABCEP Certificant, and he's a Registered Professional Engineer: 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.* **REEC 140: Renewable Energy Concepts** Renewable Energy Concepts explores the technologies used in renewable energy Systems. The course covers making, distributing and installing RE systems. Specific systems include photovoltaic, wind, geothermal, solar heating and biomass. Lab activities include proper setup and installing RE systems, measuring energy usage and controlling RE systems.
ILLINOIS, Rockford	**Photovoltaics Systems Level I** We will be learning the curriculum set by the NJATC.

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**	We will use the current student workbook and the Photovoltaic Systems textbook by James Dunlop.
ILLINOIS, Sugar Grove **Waubonsee Community College** Route 47 at Waubonsee Drive Sugar Grove, IL 60554 **Contact:** Paul Hummel, Dean for TMPS **Email:** phummel@waubonsee.edu **Tele.** (630) 466-7900 ext.2319 **www.waubonsee.edu**	**Photovoltaic (PV) Entry Level Achievement** Waubonsee will offer a series of courses to prepare students for the NABCEP PV Entry Level Examination. The Photovoltaic (PV) Entry Level Achievement requires three courses: RET 110 Introduction to Photovoltaic Systems, RET 115 Photovoltaic Systems Selection and Design, and RET 120 Installing and Maintaining Photovoltaic Systems. Each course is two lecture/two lab hours equal to 64 contact hours.
INDIANA – Fort Wayne **Fort Wayne Electrical JATC** 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, Beloit **North Central Kansas Technical College** 3033 US HWY 24 Beloit, KS 67420 **Contact**: Ray Winkel **Tele.** 785-738-9054 **Email:** rwinkel@ncktc.edu http://www.ncktc.edu/programs/beloit/electricity/home.htm	**Course description pending**
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**	Course description pending
KANSAS, Chanute **Neosho County Community College** 800 W. 14th Street Chanute, KS 66720 **Contact:** Brenda Krumm **Tele.** (620) 431-2820 ext. 234 **Email: bkrumm@neosho.edu** **www.neosho.edu**	**The Solar Pathway** The Solar Pathway teaches competencies developed by NABCEP. These skills prepare students to sit for NABCEP PV Entry Level and the NABCEP Solar Heating Entry Level Exams. SUST 104 – PV Systems SUST 106 – PV Systems Installation SUST 108 – PV Systems Troubleshooting SUST 204- Solar Hot Water & Heating Systems SUST 206 – SHW & Heating Installation **SUST 208 – SHW & Heating Troubleshooting**
KENTUCKY, Florence **Gateway Community and Technical College** 500 Technology Way Florence, KY 41042 **Contact**: Thomas Collins, Prof. of Electrical Technology **Tele. (859) 442-4106** **Email:** tom.collins@kctcs.edu www.gateway.kctcs.edu	**Solar/Photovoltaic Technologies EGY 230** This 60-hour course (4 semester hours) is part of a Solar/PV technologies certificate and an associate degree in Energy Technologies. The course is 50% le3cture and 50% lab, covering the ten major categories of the NABCEP Entry Level Program. Objectives of the course include developing the participant's ability to 1) determine the available solar resource and conduct site assessments for PV installations, 2) characterize the operating characteristics and performance of PV systems, 3) determine appropriate code-compliant configuration 4) plan and prepare for installations, including customer relations, developing performance expectations, responsibilities and schedule, 5) implement and modify mechanical design that meet

	performance, architectural and structural requirements, 6) implement and modify electrical designs for PV systems that meet the safety, code-compliance, and functional requirements, 7) conduct acceptance tests and inspections, and commission PV system installations, and 8) evaluate, troubleshoot and maintain PV systems.
KENTUCKY, 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.
KENTUCKY, Madisonville **Madisonville Community College** 2000 College Drive Madisonville, KY 42431 **Contact:** Jake Hildebrant **Tele.** 270-883-1160 **Email:** jake.hildebrant@kctcs.edu	**The ENM 121 course qualifies students to take the** NABCEP PV Entry Level Exam while earning college credits. All students of the Energy Management program receive very low cost, in-state tuition. The course is an 8 week course that does not require a textbook. This is one of the 5 courses in the Energy Management program at Madisonville Community College that has an embedded, national certificate. All of the courses do not require textbooks, but students need an iPad.
LOUISIANA - Baton Rouge **Baton Rouge Community College** 201 Community College Drive Baton Rouge, LA 70806 **Contact**: Will Seaman, Program Director of the Economic Development Division **Tele.** (225) 216-8436 **Email:** seamanw@mybrcc.edu ; justin@gulfsouthsolar.com	**Solar Panel Design and Installation Course:** Students taking this course will learn up-to-date information in regards to solar panel design and installation; and potential tax rebates offered at the state and federal level. The course is taught by industry professionals that bring actual field and business knowledge to the learning experience. The course utilizes the Solar Energy International text, *Photovoltaics: Design and Installation Manual*; information from the Florida Solar Energy Center; and follows the learning objectives for the NABCEP Entry Level Certificate Program. Class time is 45 hours which is broken up into two settings: classroom and hands-on lab. During lab time, students will do actual installation of various solar panel systems in a state of the art training facility. Students who successfully complete all course hours will be offered the NABCEP Entry Level Exam as a part of the course. Textbooks are included.

MAINE, Bangor **Eastern Maine Community College** 354 Hogan Road Bangor, ME 04401 **Contact/Instructor:** Richard Reardon **Email:** rreardon@emcc.edu **Tele.** (207) 974-4634 **www.emcc.edu**	**Solar Photovoltaic 40 hr Entry Level** **This instructor led 40 hour course is designed to introduce the elements of a properly designed and installed solar PV system, to prepare individuals for an entry level position with a solar PV company, and to prepare individuals to take the NABCEP Entry Level Exam. This course will closely follow the NABCEP PV Entry Level learning objectives to include PV markets & Applications, Safety Basics, Electrical Basic, Solar Energy Fundamentals, PV Module Fundamentals, System Components, PV System Sizing Principles, PV System Electrical Design, PV System Mechanical Design, Performance Analysis and Troubleshooting.**
MAINE, Fairfield **Augusta Electrical JATC** 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:** Michael Paradis, PV Instructor **e-mail:** mparadis@kvcc.me.edu **Tele.** (207) 453-5819 **www.kvcc.me.edu** **http://www.kvcc.me.edu/Pages/Energy-Services-Center/Renewable-Energy-Technology-Courses** **ON-LINE OPTION!**	**Solar PV for the Entry Level Candidate** This course is geared toward individuals who have limited experience with solar PV systems and are interested in developing their understanding of solar PV technology. Upon completion, students will be eligible to take the NABCEP PV Entry Level exam. Successful completion of this course and a passing score on the NABCEP exam will provide a required credential for professionals who want to install systems that qualify for the Efficiency Maine Trust Solar PV rebate program. Students will be expected to have basic electrical skills, and basic knowledge of roofing materials and construction.
MAINE, Presque Isle **Northern Maine Community College** 33 Edgemont Drive Presque Isle, ME 04769 **Contact:** Leah Buck **e-mail:** lbuck@nmcc.edu **Tele.** (207) 768-2768	**Photovoltaic Systems** This course is designed to provide students with an understanding of Solar Photovoltaic Systems and installation of the different types of Solar Photovoltaic Systems used. Understanding and applying the most current National Electrical Code standards are taught in this course. The course will cover all of the major topic areas that make up the North American Board of Certified Energy Practitioners (NABCEP) entry level PV exam.

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

Contact: Grant Shmelzer **Phone:** (800) 470-3013 **Website:** www.iec-chesapeake.com	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.
MARYLAND, Rockville **Montgomery College** Gudelsky Inst. For Technical Education 51 Mannakee St. Rockville, MD 20850 **Contact :** John Phillips, Program Director **Email :** john.phillips@montgomerycollege.edu **Phone** (240) 567-7942 **www.montgomerycollege.edu**	**Solar PV Design & Installation** Learn the fundamentals necessary to design & install a solar photovoltaic system. This course will cover residential PV systems including layout, installation, equipment, permitting & NEC issues, as well and financial & environmental incentives.
MARYLAND, Waldorf **College of Southern Maryland** 17 Irongate Drive Waldorf, MD 20602 **Contact :** Dr. Ricky C. Godbolt **Email :** rgodbolt@csmd.edu **Phone** (301) 593-4733 **www.csmd.edu/about/centers/tradesenergytraining**	**Introduction to Solar Photovoltaics** This module is designed for trainees who wish to pursue a career in solar energy. It covers the basic concepts of PV systems and their components. It also explains how PV systems are sized, designed, and installed. Successful completion of this module will help prepare trainees for the NABCEP Entry Level Exam**.**

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, 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, Fall River **Bristol Community College** Center for Workforce and Community Education 1082 Davol Street, 2nd Floor Fall River, MA 02720 **Contact:** Elizabeth Wiley, Director, The Green Center **Email:** Elizabeth.wiley@bristolcc.edu **Tele.** (508) 678-2811 ext. 2565 www.bristol.mass.edu	**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, Greenfield **Greenfield Community College**	*** 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

One College Drive Greenfield, MA 01301 **Contact**: Peter Talmage **Email:** talmagep@gcc.mass.edu **Tele.** (413) 775-1472 www.gcc.mass.edu	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, North Adams **North Berkshire Vocational School District** 70 Hodges Cross Road North Adams, MA 01247 **Contact:** James J. Brosnan, Superintendent **Tele:** (413) 663-5383 **Email:** jbrosnan@mccanntech.org **www.mccanntech.org**	**Photovoltaic (PV) Entry Level Program** This program will explain the basic fundamentals for photovoltaic systems. It will introduce students to PV markets and applications, general and electrical safety basics, solar energy fundamentals, PV module fundamentals, system components, PV system sizing principles, PV system electrical design, PV system mechanical design and performance analysis, maintenance and troubleshooting. Students will be able to sit for the exam at the end of the course.
MASSACHUSETTS, Pittsfield **Berkshire Community College** 1350 West Street Pittsfield, MA 01201 **Contact:** Denise Johns **Tele:** (413) 236-2125 **Email:** djohns@berkshirecc.edu **www.berkshirecc.edu**	**Principles of PV Installation** This course is intended to provide the technical knowledge and practical experience required for entry into the field of PV systems. Participants are expected to come from tradesman, particularly those in the electricians trade, who are interested in expanding their expertise into solar energy systems. A major goal of this course is to fulfill a significant part of their training for entry into the field. To meet this goal, this course was designed in concert with the guidelines (Learning Objectives) of NABCEP.
MASSACHUSETTS, West Barnstable **Cape Cod Community College** 2240 Iyannough Road West Barnstable, MA 02668 **Contact:** Valerie Massard, Program Coordinator, Environmental Technology &	**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

Clean Energy **E-mail:** vmassard@capecod.edu **Tele:** (508) 362-2131 x4468 www.capecod.edu	electric systems. Students also learn how to perform an economic and environmental analysis of proposed systems. **ENV178: Photovoltaic Installation** This course introduces students to the fundamentals of photovoltaic (PV) system installation and maintenance procedures. The class is divided between classroom based lectures/activities and project based activities involving the installation of a residential scale PV system. Students who complete this course are eligible to take the NABCEP Entry Level Solar PV exam (for an additional fee).
MASSACHUSETTS, Worcester **Quinsigamond Community College** 280 May Street Worcester, MA 01602 **Contact:** Mary Knittle **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, Ann Arbor **HeatSpring Learning Institute** 401 Stadium Blvd. Ann Arbor, MI 48104 **Contact:** Brian Hayden, Director of Education **Email:** bhayden@heatspring.com **Tele.** (800) 393-2044 ext. 44 http://www.heatspring.com/courses/solar-pv-installer-boot-camp-training--online **ONLINE Option**	HeatSpring's Solar Installer Boot Camp teaches students to design, install, and sell solar PV (electric) systems. Five days of intense training are split between two days of online assignments, plus three days in the classroom. Classroom time includes hands-on design and installation exercises with a full demo array. Students have the option of taking the NABCEP Entry Level Exam at the conclusion of the course, or coming back at a future training date to take the exam.
MICHIGAN, Chelsea **Ann Arbor Electrical JATC** 13400 Luick Dr. Chelsea, MI 48118 **Contact:** Jeffrey Grimston, Training Director **Email:** jatcjgrim@aol.com **Tele.** (734) 475-1180	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

Instructor: Robert Kosky **www.aaejatc.org**	requirements for each type of system. System sizing, mechanical integration, electrical integration, utility interconnection, permitting and inspection, commissioning, maintenance, troubleshooting, and economic analysis form the balance of the course.
MICHIGAN, Traverse City **Northwestern Michigan College** NMC-EES 1701 E. Front St. Traverse City, MI 49686 **Contact: Bill Queen, Carol Evans** **Email:** BQueen@nmc.edu **Tele.** (231) 995-1701 **www.nmc.edu/ees**	**Photovoltaic (Solar) Electric Systems One-week intensive – NABCEP Entry Level:** Learn the fundamentals of PV system design and installation in this 40-hour workshop designed for those interested in the expanding PV industry. In NMC's state-of-the-art Energy Demonstration Center you will gain a technical foundation in stand-alone and grid-tied code compliant solar electric systems. The course content will follow NABCEP's learning objectives for the Entry Level exam.
MICHIGAN, Warren **Detroit JATC** 2277 E. 11 Mile Road, Suite 1 Warren, MI 48092 **Contact:** Thomas W. Bowes **Email:** tomb@det-ejatc.org **Tele.** (586) 751-6600	**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 acquisition, electrical code, and safety.
MINNESOTA, Hibbing **Hibbing Community College** 1515 East 25th Street Hibbing, MN 55746 **Contact**: Michael Raich Dean of Academic Affairs and Student Services **Email:** michaelraich@hibbing.edu **Tele.** (218) 262-6702 **Instructor:** Jesse Dahl jessedahl@hibbing.edu	**ELM2401 Photovoltaic Systems Theory and Design** Photovoltaic (PV) Systems Theory and Design covers the introduction of photovoltaic fundamentals, terms, applications and applicable National Electrical Code articles. This is the first of two courses to prepare students for the NABCEP Entry Level PV exam. **ELM 2402 Photovoltaic Systems Installation, Maintenance and Troubleshooting** Photovoltaic (PV) Systems Installation and Maintenance covers the installation and commissioning of various photovoltaic systems and applicable National Electrical Code articles. This is the second of two courses to prepare students for the NABCEP Entry Level PV exam.
MINNESOTA, Minneapolis **Minneapolis Community and Technical College** 1501 Hennepin Ave. Minneapolis, MN 55403	**Introduction to Solar PhotoVoltaics** This course covers the basics of photovoltaic solar energy systems. You will receive hand-on training and experiment with simulated lab projects involving solar photovoltaic systems. Must be in or have completed an accredited electrical training program.

Contact: Greg Skudlarek **Email:** Greg.Skudlarek@minneapolis.edu **Tele.** (612) 659-6424	
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** **Customized Training and Continuing Education** 60 East Plato Boulevard Drake Building, Suite 150 St. Paul, MN 55107 **Contact:** Cheryl Beaumier **Email:** cheryl.beaumier@saintpaul.edu **Tele.** 651-846-1438 **Instructor**: Daryl Thayer **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, Bridgeton **St. Louis Community College**	**Solar Photovoltaic Installation Fundamentals** This program prepares students to compete for entry-level positions in the solar electric industry. Students will gain fundamental knowledge and hands-on training

3221 McKelvey Road Bridgeton, MO 63044 **Contact:** Rene Dulle, Sr. Project Coordinator – Sustainable Technologies **Email:** rdulle4@stlcc.edu **Tele.** (314) 539-5296 www.stlcc.edu	in installing solar PV systems. In addition, basic principles of solar sales and National Electric Code will be included. Students will have the opportunity to ear OSHA 10 certification and prepare for the NABCEP PV Entry Level Exam.
MISSOURI, Kansas City **Metropolitan Community College** Institute for Workforce Innovation Continuing Professional Education 3201 SW Trafficway Kansas City, MO 64111 **Contact:** John Littleton **Email:** john.littleton@mcckc.edu **Tele.** (816) 604-5419 **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.
MISSOURI, Neosho **Crowder College** MARET / SOLAR 601 Laclede Neosho, MO, 64850 **Contact:** Joel Lamson, Solar Technology Instructor **Email:** joellamson@crowder.edu **Tele.** (417) 455-5719 **Instructor**: Joel Lamson www.crowder.edu	**Course description pending**
MISSOURI, Sedalia **State Fair Community College** Renewable Energy Technology 3201 W. 16th Street Sedalia, MO. 65301-2199 **Contact:** Mark Kelchner, Dean, Technical	State Fair Community College's Renewable Energy Technology Solar Electric program prepares students to pursue careers in the Solar PV industry. The program is structured to provide students with a fundamental understanding of the theory and application of the various types of renewable energy technology. The program enables each student to develop an in-depth understanding of how to design, specify, adapt, implement, configure, install, inspect, and maintain photovoltaic systems, including grid-connected and

Education and Workforce Innovation **Email:** mkelchner@sfccmo.edu **Tele.** (660) 596-7402 www.sfccmo.edu	stand-alone systems, with or without battery storage for residential and commercial applications. The program will offer students both class room and hands on lab experience, as well as an opportunity to install a system on a building. Internship opportunities will be offered. In addition, the program will emphasize OSHA safety training and detailed understanding of the National Electrical Code as it applies to the installation of Solar PV systems. The curriculum is structured to cover all the objectives for the North American Board of Certified Energy Practitioners (NABCEP) Entry Level Exam.
MONTANA, Missoula **University of Montana – College of Technology** Department of Applied Computing and Electronics 909 South Ave W Missoula, MT 59801 **Contact:** Beth Shirilla **Email:** beth.shirilla@umontana.edu **Tele.** (406) 243-7916 **Instructor**: Greg Guscio **www.cte.umt.edu** **http://ace.cte.umt.edu/programs/energy.html**	**NRG243 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**. EET105 DC Circuit Analysis, or approved equivalents.
NEVADA, Las Vegas **Southern Nevada Electrical JATC** 62D Legion Way Las Vegas, NV 89110 **Contact/Instructor(s):** Chris Brooks, Robert Buntjer, Guy Snow **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 **Truckee Meadows Community College** 7000 Dandini Blvd Reno, NV 89512 **Contact/Instructor(s):** Wes Evans **e-mail** : wevans@tmcc.edu **Tele. (775) 856-5316**	**Solar Photovoltaic Certification:** This course is designed to give students the basic knowledge of solar energy principles and photovoltaic applications. Topics will be application, safety, basic electricity, solar energy fundamentals, PV module fundamentals, system components, PV system sizing, mechanical design, performance analysis and troubleshooting.

Web: www.tmcc.edu	
NEW HAMPSHIRE, Laconia **Lakes Region Community College** 379 Belmont Road Laconia, NH 03246 **Contact: 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, East Orange **Comtec Institute** 44 Glenwood Avenue Suite 201 East Orange, NJ 07017 **Contact:** Ade Oluokun **Email:** comtecjobtraining@hotmail.com **Tele.** (973) 673-6100	**PV Installer Entry Level** The purpose of this curriculum is to empower the student with a basic understanding of the photovoltaic system. In this study the individual is taught the principles in PV system designing, installation, energy conservation and efficiency and safety issues relating to electricity and photovoltaic systems. Our goal is to prepare the individual to find an interest in a new and exciting career. Potential graduates will be able to sit for the NABCEP entry level exam. Career opportunities includes; PV system design and installation, customer service associate and DAS (data acquisition System). There is a wide range of in-house lab where the student has hands on energy analysis and system design as well as installation.
NEW JERSEY, Carneys Point **Salem Community College** The Energy Institute 460 Hollywood Avenue CarneysPoint, NJ 08069 **Contact:** Gail Coley, Administrative Assistant **E-mail:** coley@salemcc.edu **Tele.** (856) 351-2604 **Web:** www.salemcc.edu	**Solar Photovoltaic Electric Systems:** This course is designed to provide the student with the knowledge necessary to take the NABCEP PV entry level exam. The student will learn the knowledge core for the NABCEP entry level exam (PV). This is an introductory course for individuals wanting to gain employment in the solar pv industry. This is both a classroom/hands-on instructional/format available for non-credit or college credit. 45 hours.
NEW JERSEY, Edison **Information & Technology Management** 6 Kilmer Road Edison, NJ 08817 **Contact:** Raj Gandhi **E-mail:** rajg@itmsys.com **Tele.** (732) 339-9801 ext. 504 www.itmsys.com	**Solar Technician Program** This 300 hour program provides a solid understanding of PV markets and applications, safety basics, electricity basic, solar energy fundamentals, PV system mechanical design and performance analysis, maintenance and troubleshooting. Students who complete this program are qualified to take the NABCEP PV Entry Level Exam. The overall objective of the program is to provide an individual with the knowledge and skill level to obtain an entry level job in this fast growing field.

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, Jersey City **Garden State Science and Technology Institute** 591 Summit Ave, Suite 705 Jersey City, NJ 07306 **Contact:** Pankaj Patel, Director **E-mail:** pat@gssti.com **Tele.** (201) 963-1500 www.gssti.com	**Photovoltaic/Solar Panel Installer** This course uses a blended mix of instructor-led training, hands-on labs, and computer based software tools. You will learn solar-electric systems design, installation, and safety procedures, plus business and industry topics important for professionals new to photovoltaics. Our hands-on Solar training lab covers the common steps of residential solar electric retrofit. You will wire up inverters from a variety of manufacturers and mount solar panels on racking systems with roof penetrations and panel attachment. You will learn how to work with DC disconnects, inverters, AC disconnects, and load center/service panels tie in with utility.
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**	**Introduction to PV Design and Installation and Exam Prep** In this workshop you will define, describe and apply the following core skill sets: PV markets and applications, safety basics, electricity basics, solar energy fundamentals, PV module fundamentals, system components, PV system sizing principles, PV system electrical design, PV system mechanical design, performance analysis, maintenance and troubleshooting. NABCEP exam is available at an additional cost.
NEW JERSEY, Newark **Bright Horizon Institute** 60 Park Place, Suite 302 Newark, NJ 07102 **Contact:** Zeba Fatima **E-mail:** zeba.fatima@brighthorizoninstitute.com	**Solar Panel Installer** The course gives an understanding of the core concepts necessary to work with both residential and commercial PV systems. Topics include system components, site analysis, PV module criteria, mounting solutions, safety, and commissioning. Participants will learn the fundamentals of sizing a residential battery-less grid-tied system, wire sizing, over-current protection, and grounding. This session will also review fundamental design criteria for off-grid stand-alone systems including

Tele. (973) 351-4094 www.brighthorizoninstitute.com	specifying batteries, controllers, and battery-based inverters.
NEW JERSEY, Pemberton **Burlington County College** 601 Pemberton Browns Mills Road Pemberton, NJ 08068-1599 **Contact:** Robert Brzozowski **E-mail:** rbrzozow@bcc.edu **Tele.** (609) 894-9311 www.bcc.edu/green	**AAS degree in Alternative Energy Technologies** The solar PV learning objectives are covered in two courses: SST 211 Solar PV Systems I - Theory & Design, and Solar PV Systems II - Construction & Troubleshooting. Each course is worth 3 academic credits, consisting of 2 credits lecture and 1 credit laboratory. Solar PV Systems II concludes with construction and commissioning of a working solar PV system on a ground-level mock solar roof. Solar PV I - Prerequisite: Physics 110 & 111 Principles of Physics I & Laboratory; Co-requisite EET 121. Solar PV II - Pre-requisite: solar PV I; Co-requisite: EET 225 Wiring - Residential and Commercial Construction.
NEW JERSEY, Piscataway **Rutgers University** 96 Frelinghuysen Road Piscataway, NJ 08854 **Contact:** Stephen Carter **E-mail:** scarter@rutgers.edu **Tele.** (732) 445-4700	**Solar PV Bootcamp** This 40-hour program includes the basics of the PV market, PV system components, electrical basics, safety, PV system sizing considerations, PV siting, and performance analysis/troubleshooting. The course includes hands-on training with a solar cart.
NEW JERSEY, Scotch Plains **Union County Vocational Technical Schools** Adult Post Secondary/Continuing Ed. 1776 Raritan Road Scotch Plains, NJ 07076 **Contact:** Lisa Tauscher, Principle Adult Education **E-mail:** ltauscher@ucvts.tec.nj.us **Tele.** (908) 889-8288 ext. 313 www.ucvts.tec.nj.us	**Photovoltaic Systems (Solar Systems)** **Duration: 40 hours** This course teaches the basic Technology and skills for entry level knowledge of the design and installation of solar photovoltaic systems. 1. Solar Energy Fundamentals 2. Working Safely with PV Systems 3. System Types: Direct Grid-tie & Battery-Based PV 4. Conducting a Site Assessment 5. Electricity Basics 6. Selecting a System Design 7. Adapting the Mechanical Design 8. Adapting the Electrical Design 9. PV Module Fundamentals 10. Installing Subsystems and Components at the Site 11. System Installation, Layout, Mounting Assembly 12. Performing a System Checkout and Inspection Maintaining and Troubleshooting a System

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 JERSEY, Washington **Warren County Community College** 575 Route 57 West Washington, NJ 07882 **Contact:** Maija Amaro, Workforce and Industry Training Specialist **E-mail:** mamaro@warren.edu **Tele.** (908) 835-4029 **www.warren.edu**	**Introduction to Solar Photovoltaics** The course will be instructor led by a NABCEP Certified PV Installer. The course will cover all entry level learning objectives and presentation of real solar installations will be featured to help reinforce the objectives. Emphasis on safety will be provided along electrical safety principles of using typical test equipment on a job site.
NEW MEXICO – Albuquerque **Central New Mexico Community College** 5600 Eagle Rock Ave. Albuquerque, NM 87113 **Contact**: Evelyn Dow Simpson Associate Director, Workforce Training Center **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. CNM School of Applied Technologies offers 4 college credit classes in the field of photovoltaic installation. Upon completion, the four classes result in 12 college credit hours and a certificate of completion. These classes are designed for students with an electrical background, either journeyman electricians or students who have completed a minimum of two terms of Electrical Trades training. This series of courses offer extensive coverage of photovoltaic theory, design, safety, and installation, including a hands-on lab. The classes offered are: *ELTR 2610 PV Installation Safety; ELTR 2620 PV Theory, Design, and*

	Installation; ELTR 2692 PV Installation Lab; and *ELTR 2630 Advanced PV Theory, Design, Installation, Maintenance and Commissioning.*
NEW MEXICO – Las Cruces **Dona Ana Community College** 2345 E Nevada Ave. Las Cruces, NM 88001 **Contact:** Daniel Reynolds **e-mail:** Dreynolds@dacc.nmsu.edu **Tele. (**575) 528-7456 http://dabcc.nmsu.edu/tis/eeth/	**TCEN 110. Photovoltaic Application** TCEN 110. Photovoltaic Application 4 cr. (3+2P) This course will provide an introduction to Photovoltaic (PV) installation. The course will provide instruction on: Site Selection, System Design, Installation, and maintenance for photovoltaic applications. Students that complete the course and have the opportunity to take the entry level exam with the North American Board of Certified Energy Practitioners (NABCEP) en route to becoming Certified Installers.
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**	**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.
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	**Course description pending**
NEW YORK, Buffalo **Erie Community College** Workforce Development 121 Ellicott Street Buffalo, NY 14203	**PV – Entry Level Photovoltaics (Solar Power)** 40 hour PV Solar Energy Systems Design & Theory preparation course for NABCEP Entry Level Exam. Basics of site design, installation, sizing, safety, mounting types for PV arrays. Curriculum based on NABCEP Entry Level learning objectives. Small class

Contact: Gene Covelli, Project Director **Email: covelli@ecc.edu** **Tele: (716) 851-1800 / (716) 860-7874**	lab activities will be used to demonstrate theory and installation technique.
NEW YORK, Canton **SUNY Canton** Alternative & Renewable Energy Systems CSOET, NN105 Canton, NY 13617 **Contact/Instructor**: Matthew Bullwinkel **Email:** bullwinkel@canton.edu **Tele.** (315) 386-7411 **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.** 65 Elm Street Copiague, NY 11726 **Contact**: Salvatore Ferrara **Instructor:** Jerry Flaherty **Email:** sal@electricaltrainingcenterLI.com **Tele.** (631) 226-8021	**Basic Designing and Installing Solar Photovoltaic Systems -** This dynamic 46 hour course is designed to train electrical contractors, journeymen, and other skilled trades' people in designing and installing solar photovoltaic systems. This is an intense all inclusive course that will cover solar and electrical theory, practical installation methods and techniques, PV business management and concludes with the installation of a grid connected solar photovoltaic system. This course employs both classroom lecture and hands-on training. We offer this course at night and one Saturday; we also offer this course as a six day intensive course. "Basic Designing and Installing Solar Photovoltaic Systems" fulfills the New York State Energy Research and Development Authority (NYSERDA) requirements for installers and preparing our students to take the NABCEP PV Entry Level Exam. "Basic Designing and Installing Solar Photovoltaic Systems" teaches the 10 NABECP learning objectives in 11 sessions as outlined below: 1) Overview of Solar Photovoltaics – PV history & applications and PV systems 2) Solar Fundamentals – Solar definitions, function and light to electric 3) Site Assessment – Information gathering, what to look for and best location 4) Evaluating solar irradiance- Array tile, orientation, shading and sizing PV array 5) Electrical Aspects of PV – AC/DC circuits, series-parallel circuits, sizing systems 6) Safety Considerations- OSHA - electric, roof and general worksite safety 7) Building Codes and the 2008 NEC pertaining to PV 8) Putting it together – Design complete PV system to be installed 9) Installing a residential or commercial PV

	system (8 hours) 10) Photovoltaics incentives and rebates – LIPA & NYSERDA programs 11) Running Your PV business – A look at a PV contractors day Hands-on experience installing a grid-tied and battery based system
NEW YORK, Delhi **SUNY Delhi** 146 Bush Hall 2 Main Street Delhi, NY 13753 www.delhi.edu **Contact**: Glenda Roberts, 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
NEW YORK, Dryden **Tompkins Cortland Community College** 170 North St PO Box 139 Dryden, NY 13053 **Contact**: Carrie Coates Whitmore **Email:** CLW@TC3.edu **Tele.** (607) 844-6586 http://www.tc3.biz/green_energy.asp	**Solar Photovoltaic Systems and Installation** Gain an understanding of solar photovoltaic systems and installation. Students will participate in a large hands-on indoor demonstration of the installation of a 4 kW roof-mounted solar electric project. Students will prepare for the NABCEP PV Entry Level Exam.
NEW YORK, East Farmingdale **Molloy College** 7180 Republic Airport East Farmingdale, NY 11735 **Contact**: Louis Cino, Dean/Division of Continuing Education **Email:** lcino@molloy.edu **Tele.** (516) 678-5000 x6357 **www.molloy.edu**	**Photovoltaic Installation and Design Course** This class will prepare students for the NABCEP Entry Level Exam. Our course will focus on topics such as Photovoltaic System Design and review, a hands-on PV Installation and Battery Workshop, detailed Mathematics and Electronic Theory, Worker Safety and Managing Electronic Hazards. This 40 hour course is spread over 5 days and each class is 8 hours. Working with a team of instructors, students will get the most out of this hands-on solar learning session. Also, our instructors will be able to pay attention to individual questions there might be. A copy of Photovoltaic Systems and Photovoltaic Design and Installation Manual will be provided for each student to further enhance their learning experience. In-class instructors will show students all the tools of the trade along with interactive exercises on how to use each one. Our class size is limited to 18 students and after our course is completed students must pay a $100 exam fee that is not covered by tuition.

NEW YORK, Elmsford **Southern Westchester BOCES** 85 Executive Boulevard Elmsford, NY 10523 **Contact**: Harry J. Kaplan, Supervisor **Email:** hkaplan@swboces.org **Tele.** (914) 592-0849	**Introduction to PV Technology** A theoretical basis for understanding the function of photovoltaic systems including history of PV, types of PV systems, system components and safety. **PV Installers Course** A hands-on course including system and component design and sizing, load analysis, system placement, installation methods, code compliance and safety.
NEW YORK, Farmingdale **SUNY Farmingdale** 2350 Broadhollow Road Farmingdale, NY 11735 **Contact/Instructor**: Adam Filos **Email:** filiosaa@farmingdale.edu **Tele.** (917) 280-4225	**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, Johnstown **Fulton-Montgomery Community College** 2805 State Highway 67 Johnstown, NY 12095 **Contact Person**: Laura LaPorte, Associate Dean for Enrollment Management **e-mail:** laura.laporte@fmcc.edu **Tele.** (518) 736-3622 **www.fmcc.edu**	**Introduction to (Solar) Photovoltaic Technology** This is a non-credit class designed for individuals with an interest in solar photovoltaic (PV) technology, as well as those who are considering entering a career in PV. This course will provide the student with the theoretical basis for understanding the various types of solar PV systems. The class will also include hands-on training PV exercises and project based activities. The course is comprised of ten outcome based instructional learning modules that are aligned with the NABCEP PV Entry Level Learning Objectives. They include: PV Markets & Applications, Safety Basics, Basic System Sizing, PV System Electrical Design, Beginning PV System Mechanical Design, and Understanding Performance Analysis and Troubleshooting.
NEW YORK, Kew Gardens **Access Careers, Queens** 80-02 Kew Gardens Road Level SC1 Kew Gardens, NY 11415-3600 **Contact Person:** Richard Gunasingh **e-mail:** rgunasingh@aol.com **Tele.** 718-263-0750 **www.accessqueens.com**	**Solar Technician Assistant** The Solar Technician Assistant program provides the student with a solid understanding of PV markets and applications, electricity basics, safety basics, and solar energy fundamentals. It includes extensive hands-on work with PV modules, system components, system electrical and mechanical design, and PV system maintenance and troubleshooting -- leading to NAPCEP certification and entry-level employment as a Solar Technician Assistant.
NEW YORK, Kingston	**Photovoltaics (PV) Installer's Course:** Learn the basics of how to site, design and install photovoltaic

SUNY Ulster Business Resource Center One Development Court Kingston, NY 12401 **Contact Program Coordinator**: Barbara Reer **e-mail:** ReerB@sunyulster.edu **Tele.** (845) 802-7171 **www.sunyulster.edu**	(PV) systems. This course includes sizing systems for both grid-connected and off-grid PV systems. Learn about solar resources, the problems associated with shading and what is the best orientation and tilt for PV arrays. Discuss the basic sizing and design of systems to serve a given electrical load. Learn safety procedures for installers and study the electrical code for PV systems in detail. Study various mounting systems for PV arrays and how they affect roof. Actually install a PV system. **Advanced Photovoltaics Systems:** This course is geared toward PV installers and engineers who have experience with photovoltaic systems. The basics of PV will not be covered. Topics discussed will include the future of solar energy systems, review of formulas needed to size PV, how to design a PV system with battery backup, PV mounting systems, calculating wind load, weight load on roofs, mounting, safety on roofs, calculating system efficiency, wire sizing, performance monitoring, shading analysis, troubleshooting and complying with NYSERDA forms and regulations.
NEW YORK, Morrisville **Morrisville State College** PO Box 901 80 Eaton Street Morrisville, NY 13408 **Contact:** Christopher Nyberg, Dean, School of Agriculture and Natural Resources **email:** nybergcl@morrisville.edu **Tele.** (315) 684-6083 **www.morrisville.edu**	**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) **Bronx Community College** **Center for Sustainable Energy** City University of New York West 181st Street Bronx, NY 10453 **Contact**: Dr. Joseph Bush **e-mail:** joseph.bush@bcc.cuny.edu **Tele.** 508-344-1608 **www.csebcc.org for this and other Renewable Energy courses offered at Bronx Community College.**	The Center for Sustainable Energy (CSE) has developed the following sequence of classes for Photovoltaic (Solar Electric) Training: 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, NYC, Brooklyn **New York City College of Technology** The City University of New York 300 Jay Street, Howard Building 4th Floor	**Introductory Solar Energy (PV) Design & Installation** An introductory solar energy overview course taught in accordance with the NABCEP PV entry level learning objectives. Students will recognize and understand components of off-grid and grid-connected PV systems as well as the interlink between design criteria and the

Brooklyn, NY 11201-1109 **Contact:** Carol Sonnenblick **e-mail:** csonnenblick@citytech.cuny.edu **Tele.** (718) 552-1180 or (718) 552-1181 www.citytech.cuny.edu/academics/continuinged/	economic impact of various options. Students will learn to identify all basic mechanical and electrical components as well as hoe they are attached to the user's property and wired together following appropriate guidelines and codes. Prerequisite: fundamentals of Electricity EMX 090 or permission of the instructor.
NEW YORK, NYC **Pace University** One Pace Plaza Suite 424 New York, NY 10038 **Contact:** Sylvia Russakoff, Director Pace University Computer Learning Center **E-mail:** srussakoff@pace.edu **Tele. (914) 422-4328** www.pace.edu/pace/ http://appsrv.pace.edu/pclc/.	**Course description pending**
NEW YORK, Port Ewen **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	**Photovoltaic- Core Sequence of Classes Include** Electrical Theory for Renewable Energy Practitioners Introduction to PV Technology PV Installer's Course OSHA Safety Training & Certification PV Technical Sales & Marketing NABCEP PV Entry Level Exam Prep Course NABCEP PV Entry Level Exam **Please call 845-331-5050 for more information or to register for any of these classes.**
NEW YORK, Plattsburgh **Clinton Community College** 136 Clinton Point Drive Plattsburgh, NY 12901 **Contact:** Paul DeDominicas **e-mail:** paul.dedominicas@clinton.edu **Tele.** (518) 562-4144 www.clinton.edu	The course is designed for individuals who are interested in learning the fundamentals of photovioltaic (PV) systems design and installation. The objective of the course is to prepare students for taking the NABCEP Entry Level Exam. The course curriculum is designed to comply with NABCEP's learning objectives for the Entry Level Exam.
NEW YORK, Selden **Suffolk County Community College**	**Solar PV Installation & Design** This program will provide the student with the technical and educational skills required to enter the emerging

533 College Road Selden, NY 11784 **Contact:** Jeanne Durso **e-mail:** dursoj@sunysuffolk.edu **Tele.** 631-451-4470 www.sunysuffolk.edu	solar industry. It is a 90-hour college certificate program (non-credit) with 45 hours devoted to classroom instruction and 45 hours of hands-on instruction.
NEW YORK, Syracuse **SUNY College of Environmental Science and Forestry (SUNY-ESF)** 221 Marshall Hall 1 Forestry Drive Syracuse, NY 13210 **Contact:** Sean Nicholson, Program Specialist **Tele.** (315) 470-4882 **Email: scnichol@esf.edu** http://www.esf.edu/outreach/spare	**SPARE (Solar Power as Renewable Energy) Photovoltaic Installer and Maintenance Training:** This is a traditional classroom style, 4-day course from 8am – 5pm covering the basics of how to site, design and install grid-connected and off-grid PV systems. Some topics: the solar resource: problems associated with shading, best orientation and tilt for PV arrays. Discussions of basic sizing and design of systems to serve a given electrical load. Safety practices for installers including study of the electrical code for PV systems in some detail. Study of various mounting systems for PV arrays and how they affect roofs. We will build a working PV system on the lawn.
NEW YORK, Troy **Hudson Valley Community College** Workforce Development Institute, JRD 137 80 Vandenburgh Avenue Troy, NY 12180 **Contact/Instructor(s)**: Marlene J. LaTerra, Coordinator, Workforce Development Institute **e-mail**: m.laterra@hvcc.edu **Tele.** (518) 629-4835 **ONLINE Option**	**Hudson Valley's Photovoltaic Installation Certificate program** provides the training students need to enter the growing industry of solar panel installation and maintenance. The New York State Energy Research and Development Authority (NYSERDA) worked with Hudson Valley to develop the program as the agency anticipates a high demand for qualified PV installers with hundreds of PV systems expected to be installed in the upcoming years. The 21-credit hour program consists of required and elective courses in the Electrical Construction and Maintenance A.O.S. degree program. These courses include a basic AC/DC electricity course and residential and commercial construction wiring courses which serve as a foundation for two courses in PV theory and practice. Both the established journeyman electrician looking for advancement and the potential student interested in the renewable energy field can benefit from the Photovoltaic Installation program. **ECMN 210: Photovoltaic Systems Theory and Design (4 credits)** **ECMN 211: Photovoltaic Systems Installation and Maintenance (4 credits)** **********

	Note: contact **Workforce Development** to register for the following course: (518) 629-4235 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) 629-4235 or (518) 629-4827. THIS CLASS IS NOW ALSO AVAILBLE IN ONLINE FORMAT.
NEW YORK, Utica **SUNY Institute of Technology** 100 Seymour Road, Utica, NY, 13502 **Contact/Instructor(s)**: Elizabeth Rossi, Program Manager **e-mail**: elizabeth.rossi@sunyit.edu **Tele.** (315) 792-7383 http://sunyit.edu	Using NABCEP Entry Level Learning objectives, gain knowledge about solar energy. Understand the practical codes, electrical and solar site selection issues involved with photovoltaics: * Power management, economic development, and environmental impacts * PV Module fundamentals and components * PV System Electrical and Mechanical Design * Mock solar roof for hands-on panel manipulation * Safety harnessing and wiring demonstration * Codes and requirements for installation of grid-tied systems Successful completion of this course will prepare the student to take the NABCEP Entry Level Exam.
NEW YORK, Utica **Mohawk Valley Community College** 1101 Sherman Drive Utica, NY, 13501 **Contact/Instructor(s)**: Robert C. Decker, Professor **e-mail**: rdecker@mvcc.edu **Tele.** (315) 792-5632 www.mvcc.edu	**Intro to PV Systems** In this 40 hour theory and hands-on installation course, solar site analysis, design, layout and installation of photovoltaic (PV) systems are presented. The course is designed to develop student understanding of PV components and systems and their integration into the electrical systems in the home. Grid-tie and off-grid systems will be presented. This course will present basic system sizing and equipment operation information to individuals who desire to ultimately achieve NABCEP certified PV installer status. Upon completion, students may elect to take the NABCEP PV Entry-Level Exam . Pre-requisites: Students should have a basic understanding of applied electricity and be able to perform basic arithmetic computation. A basic scientific calculator is required.
NEW YORK, Wellsville **Alfred State College** 2530 S. Brooklyn Ave	**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

Wellsville, NY 14985 **Contact:** Craig Clark **E-mail**: clarkcr@alfredstate.edu **Tele.** (607) 587-3101 www.alfredstate.edu	course is to lead a student to understand photovoltaic systems and their components and its integration into the electrical systems of grid-tie or off-grid homes. The course curriculum is designed around the NABCEP's "Learning Objectives" for the entry-level exam. Topics covered: PV Market and Applications; Electricity and Safety Basics; Solar Energy Fundamentals; Hands-On Solar Workshop; System Components; PV System Sizing; PV System Mechanical and Electrical Design; and Performance Analysis & Troubleshooting.
NEW YORK, Yorktown Heights **Putnam/North Westchester BOCES** 200 BOCES Drive Yorktown Heights, NY, 10598-4399 **Contact:** Alyson Kistinger, 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, Candler **Asheville-Buncombe Technical Community College (A-B Tech)** Global Institute for Sustainability Technology (GIST) 1463 Sand Hill Road Candler, NC 28715 **Contact**: Haven Hanford **email:** hhanford@abtech.edu **Tele.** (828) 254-1921 x5858	**The Fundamentals of Photovoltaic System Design and Construction** A six-day course covering the NABCEP PV Entry level Learning Objectives.
NORTH CAROLINA, Charlotte **Central Piedmont Community College** Department of Geomatics & Sustainability PO Box 35009 Charlotte, NC, 28235-5009	**ELC 220 Photovoltaic Systems Technology and Design:** This curriculum course introduces students to the concepts, tools, techniques and materials needed to design and construct systems that convert solar energy into electricity with photovoltaic (pv) technologies. Course work includes site analysis for system design, building code recognition and advances in photovoltaic

Contact: Rose Mary Seymour **email:** rosemary.seymour@cpcc.edu **Tele.** (704) 330-6738 http://www.cpcc.edu/cfs	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 **National Solar Trainers, LLC** 5960 Fairview Rd., Suite 400 Charlotte, NC 28210 **Contact:** Edlin Kim, Business Development Manager **email:** Edlin@nationalsolartrainers.com **Tele.** (646) 915-5308 **www.nationalsolartrainers.com** **ONLINE Option**	**Solar PV Bootcamp –** This course gives students the in-depth knowledge any solar professional needs to know and qualifies them to sit for the sought after NABCEP entry level exam. The course even goes beyond covering the NABCEP entry level requirements to feature an extensive hands-on focus, giving students a unique experience with live demonstrations and working installations. The major portions of this course are fundamentals, sales and estimation, design and installation. This course makes students eligible for commercial-scale PV workshops and webinars focusing on knowledge specific to solar career paths in design, finance, and project management.
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** 8936 Northpointe Executive Park Dr., Suite 140 Huntersville, NC 28078	**Solar PV Associate** This 40-hour program includes the basics of the PV market, PV system components, electrical basics, safety, PV system sizing considerations, PV siting, and performance analysis/troubleshooting. The course includes hands-on training with a solar kit.

Contact: Ryan Bennett **email:** rbennett@everblue.edu **Tele.** (704) 997-0057 **www.everblue.edu** **ONLINE Option**	
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:** Maria O'Farrell **e-mail**: maria_ofarrell@ncsu.edu **Tele.** (919) 538-8287 **ONLINE Option**	**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.

	Online REPV: Renewable Energy Generation with Photovoltaic Systems This 6-week online class is the REPV class equivalent without the hands-on installation day. It gives participants the flexibility to take courses online – either through the 2 weekly scheduled live sessions or the 2 weekly recorded lectures. Live online classes will take place twice a week, 2.5 hours each session. In addition to the online lecture, there are reading and quiz requirements. After completing this class, one may take a 1 day hands-on grid-tied PV installation class at the NC Solar Center training annex in Raleigh, NC which will be offered throughout the year. **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.*
NORTH CAROLINA, Roxboro **Piedmont Community College** PO Box 1197 Roxboro, NC 27573 **Contact:** James "Mac" McCormick, Instructor **e-mail**: mccormj@piedmontcc.edu **Tele.** (336) 599-1181 ext. 319 www.piedmontcc.edu	**Sustainability Technology Certificate** This certificate stems from our current Electrical Power Production, Industrial Systems, and Electrical/Electronics Technology programs. Students in these three programs of study would need only 3 core courses to take prior to taking the NABCEP PV Entry Level Exam.
NORTH CAROLINA, Supply **Brunswick Community College** Continuing Education Department P.O. Box 30 Supply, NC, 28462 **Contact:** Marilyn Graham, Coordinator, Green Information Training Center **e-mail**: grahamm@brunswickcc.edu **Tele.** (910) 755-8561 www.brunswickcc.edu	**Solar Installer Certificate (From Brunswick CC)** This is a continuing education program designed to prepare students to understand the installation, function and repair of solar PV and solar thermal systems; to train students to safely install equipment using a combination of lecture, demonstration, discussion and hands-on lab work; and guide students to plan for job placement. The Solar Installer certificate includes: employment readiness, OSHA, basic building skills in carpentry, electricity and plumbing, and two separate solar modules: Solar Photovoltaic and Solar Thermal. This program prepares the student for the NABCEP PV Entry Level Exam.

NORTH CAROLINA, Wilmington **Cape Fear Community College** North Campus 4500 Blue Clay Road Castle Hayne, NC 28429 **Contact**: Wesley Gubitz **email:** wgubitz@cfcc.edu **Tele.** (910) 362-7528 or 7147 www.cfcc.edu	**ALT 220 – Photovoltaic System Tech.** This course introduces the concepts, tools, techniques and materials needed to understand systems that convert solar energy into electricity with photovoltaic technologies. Upon completion, students should be able to demonstrate an understanding of the principles of PV technology and current applications. Traditional class room lectures combined with hands-on lab. **2 class hours/week, 3 lab hours/week for 16 weeks: 80 hours total.**
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 – Elyria **Lorain County Community College** 1005 N Abbe Road PC 209 Elyria, OH 44035 **Contact:** Ramona Anand **e-mail**: ranand@lorainccc.edu **Tele. (**440) 366-4930 http://www.lorainccc.edu/academic+divisions/engineering+technologies/energy/solar+technology.htm	**ALET 223 - PHOTOVOLTAIC SYSTEMS** This course explores the design, installation and use of Solar-Photovoltaic power systems for consumer and commercial applications. The course covers theory and hands-on lab experience required to assess, install, maintain, and troubleshoot solar-photovoltaic electrical generating systems.
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	**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

Tele. (567) 661-7163 **www.owens.edu**	practices of project management, adapting mechanical and electrical design, and system commissioning will also be discussed. Various inverters, PV modules, batteries and data information systems will be installed and operated.
OHIO – Wooster **The Ohio State University ATI** 1328 Dover Road Wooster, OH 44691 **Contact: Zhiwu (Drew) Wang** **e-mail: wang.3997@osu.edu** **Tele.** (330) 287-1268 **http://greenenergy.osu.edu/**	**Renewable Energy Program** The Renewable Energy Program's Solar and Wind specialization at The Ohio State ATI focuses on the production of energy production from solar panels, wind turbines, and other renewable energy technologies. The two-year Associate of Science Degree program provides coursework in chemistry, biology and physics as well as six courses specific to solar and wind energy production. The Associate of Science degree allows students to complete approximately 50 percent of the requirements for a Bachelor of Science degree in agriculture at The Ohio State University.
OREGON - Eugene **Lane Community College** Science/Energy Programs 4000 East 30th Avenue Eugene, OR 97405 **Contact/Instructor(s):** Roger Ebbage, Ryan Mayfield **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, 70-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 – Tangent **Central Electrical JATC** 33309 Hwy 99E Tangent, OR 97389	**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

Contact/Instructor: Greg Creal **e-mail:** greg@ibew280.org **Tele.** (541) 917-6199 www.cjatc.org	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:** Craig Edwards, Program Manager, Renewable Energy Education **e-mail:** cedwards@northampton.edu **Tele.** (610) 332-6134 www.northampton.edu	This is an introductory course in the study of Solar Photovoltaic (PV) systems and components including system design and sizing for single residences, multifamily residences and light commercial applications; National Electrical Code rules for solar installations; related OSHA regulations; solar electric products and applications; energy conversion from sunlight to electricity; and operation of solar conversion equipment. After completing this course, students are eligible to take the North American Board of Certified Energy Practitioners (NABCEP) PV Entry Level exam.
PENNSYLVANIA – Harleysville **Associated Builders and Contractors** **South Eastern Pennsylvania Chapter** 1500 Gehman Road Harleysville, PA 19438 **Contact:** William Henry, Director of Craft Training **e-mail:** bhenry@abcsepa.org **Tele.** (215) 256-7976 **www.hacc.edu**	**Introduction to Solar Installation** – 45 hour course This course covers the basic fundamentals in the design, installation and assessment of solar photovoltaic (PV) systems for use in residential and commercial applications. The course includes the use of industry standard tools and techniques used in the installation of photovoltaic systems – the modules, inverters and system components to make a complete installation. Attendees will learn system design, sizing and requirements for the proper installation of the system.
PENNSYLVANIA - Harrisburg **Harrisburg Area Community College** Midtown 1-207, One HACC Dr.	**Solar Photovoltaic (PV) Electric Systems** Learn the fundamentals of PV system design and installation in one of either a 40- or 60-hour workshop designed for those interested in the expanding PV

Harrisburg, PA 17110 **Contact:** Cheryl Deitz, WFD Coordinator **e-mail:** chdeitz@hacc.edu **Tele.** (717) 221-1338 **Fax:** (717) 909-4014 **www.hacc.edu**	industry. In the Energy Training Center, you will gain a technical foundation in stand-alone and grid-tied code-compliant solar electric systems. The content follow NABCEP's learning objectives for the entry level exam. Other classes of interest for Entry Level students: Streamlining Solar NEC, electrical grounding and Bonding PV Field Inspector Will Solar Work for Me Selling Solar Also conducting a PV Installer Prep for the NABCEP exam and a PV Sales Prep for the Nabcep exam. Contact Cheryl Deitz for times, dates, locations and costs.
PENNSYLVANIA – Media **Delaware County Community College** 901 S Media Line Rd Media, PA 19063 Contact: Karen Kozachyn Email: kkozachyn@dccc.edu Tele. (610) 359-5362 **www.dccc.edu**	**Solar PV System Design and Installation** This International Renewable Energy Council (IREC) accredited course is designed to introduce students to grid tied photovoltaic (PV) systems. In this course students will learn the benefits of a grid tied system and the positive impact on the environment these systems can have. At the conclusion of this course students will have the basic knowledge and understanding in design and installation of residential and commercial buildings. This course is patterned after the Job Task Analysis set by the North American Board of Certified Energy Practitioners (NABCEP) Entry-Level Solar PV exam and also fulfills the prerequisite of related experience and education required sit for the industry certification. The certification is not included in the course. Upon successful completion of this course, students will be able to: • Verify System Design and determine the requirements for a photovoltaic system • Manage the Project. • Site the requirements to interconnect a photovoltaic system to the power grid. • Properly apply article 690 of the National Electric Code (NEC) • Install Electrical Components. • Install Mechanical Components. • Properly determine the financial benefits of a photovoltaic system • Complete System Installation. Properly size and install a photovoltaic system for a residential and commercial building. • Determine environmental factors that can interfere with a working photovoltaic system • Conduct Maintenance and Troubleshooting Activities.
PENNSYLVANIA - Oakdale **Community College of Allegheny County** 1000 McKee Road Oakdale, PA 15017	**Renewable Technologies Program** The Renewable/Alternative Energy Technologies program, which was founded in the Summer of 2012, provides a technical education to individuals who meet the prerequisites. The program provides individuals with the technical training for the renewable and alternative energy field.

Contact: Debra Killmeyer **e-mail:** dkillmeyer@ccac.edu **Tele.** (412) 788-7387 http://www.ccac.edu/default.aspx?id=152682	The technology-driven curriculum delivered in modules will focus on the mechanics of green energy, rather than the philosophical study of the environment. Students successfully completing the program will receive a certificate from the college and 4-credits. Topics covered include: •Safety •Solar Thermal Heating Systems •Solar Photovoltaic Systems •Wind Turbine Systems •Grid-Tie Systems •Pipes and Pumping Systems •Bio-Fuel/Hydrogen Fuel Cells
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	**Course description pending**
PENNSYLVANIA - Philadelphia **Infinite Solar, Inc** 2880 Comly Rd Philadelphia, PA 19154 **Contact:** Andrew Zimdahl, Executive Director **e-mail:** andrew@infinite-solar.com **Tele.** (215) 464-6460 www.solarschoolpa.com	**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 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	**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).

Instructor **e-mail:** richvanwert@aol.com **Tele.** (215) 245-2024	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.
PENNSYLVANIA – Phoenixville **Chester County Intermediate Unit (CCIU)** 1580 Charlestown Road Phoenixville, PA 19460 **Contact:** Andrew Jacobs, Sustainable Energy Engineering Instructor **e-mail:** drewj@cciu.org **Tele.** (610) 933-8877 x.4101 www.cciu.org	**Sustainable Energy Engineering** This 3-year, PA Dept. of Education approved career and technical education daytime program is for grades 10-12 and adults with an additional 9th grade career exploratory option year. The program offers OSHA 10 training and preparation for the electrician's licensure exam. First year concentration is basic electrical theory and practical application with Solar PV Entry Level training. A separate 40 hour adult evening course is also offered at this site for Solar PV Entry Level and OSHA 10 training.
PUERTO RICO - Aguadilla **University of Puerto Rico - Aguadilla** Building 251, Belt Road Aguadilla, P.R. 00604-6150 **Contact/Instructor(s):** Prof. Ana E. Cuebas Director, Educational Continuing Division **e-mail:** ana.cuebas@gmail.com **Tele.** (787) 890-7118, 890-2681, Ext. 264/275/269	**Introduction to Photovoltaic Solar Energy Systems:** This 45 hour course will provide the students knowledge and tools for the application of the basic concepts involved in the operation and installation of photovoltaic solar energy systems, with or without connection to the electric wire system of Puerto Rico. The participant will be able to install a complete PV system with or without batteries in the solar classroom laboratory. Regulations from the Puerto Rico Electrical Power Authority and state laws regulating the renewable energy area will be covered in the course.

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.
SOUTH CAROLINA, Greenville **Greenville Technical College** 216 Pleasantburg Drive Mail Stop 5011 Greenville, SC 29607 **Contact:** Joy N. Finch **E-mail:** joy.finch@gvltec.edu **Tele.** (864) 250-8155 **www.gvltec.edu/ccd**	**SOL 201 Solar Photovoltaic Systems (Equivalent CE Course Code: ROG651)** This course studies the installation and connections of solar photovoltaic (PV) components in residential or light commercial field applications. Students will be required to perform code compliant installations in field simulated conditions and will design and install two complete solar PV systems during the lab portion of this class. Some strenuous activities will be required to complete this course. Students must have the ability to lift 50 pounds and work above ground level to install solar systems. Prerequisite: SOL 120 or equivalent.
TENNESSEE, Brentwood **Nashville State Community College** **The Sage Group** 5300 Maryland Way Suite 103 Brentwood, TN 37027 **Contact:** Sandy Wilson **E-mail:** swilson@thesagegrp.com **Tele.** (937)748-2532 **Web: www.thesagegrp.com**	**Introduction to Photovoltaic Systems:** This introduction level course is designed for participants who want to gain knowledge and skills related to the design, installation and evaluation of photovoltaic (PV) systems. Topics covered in the course include solar PV systems, PV system design and PV system components with hands-on lab for knowledge and skill application.
TENNESSEE, Chattanooga **Chattanooga State Community College** 4501 Amnicola Highway	**Solar Energy Technology** As the nation and the world look for new sources of energy, electricity generated from renewable resources is one of the fastest growing segments in the electrical power industry. Students study the design of solar

Chattanooga, TN 37406 **Contact:** William Wan **E-mail:** william.wan@chattanoogastate.edu **Tele.** 423-697-4726 **Web:** **http://www.chattanoogastate.edu/engineering-technology**	systems, components, equipment subsystems, and installations. Emphasis is placed on safety, basic installations, and connecting a Photovoltaic system to the electrical grid. Commercial and Residential installation technician, energy audit technician, and Photovoltaic systems technician are a few of the career options available to graduates.
TENNESSEE, Cleveland **Cleveland State Community College** 3535 Adkisson Drive NW PO Box 3570 T101A Cleveland, TN. 37320 **Contact/Instructor(s):** Allan Gentry **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 College of Applied Technology 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, Knoxville **University of Tennessee** **Center for Industrial Services** 105 Student Services Building Knoxville, TN 37996 **Contact:** Earl Pomeroy, Instructor **E-mail:** earl.pomeroy@tennessee.edu **Tele.** (615) 532-3328 www.cis.tennessee.edu/	**Course description pending**

TENNESSEE, McKenzie **Tennessee College of Applied Technology, McKenzie** Electronics and Green Technology 16940 Highland Drive McKenzie, TN 38201 **Contact:** Bruce Moore, Instructor **E-mail:** bruce.moore@ttcmckenzie.edu **Tele.** (731) 352-5364 **www.tcatmckenzie.edu**	**Course description pending**
TENNESSEE, Pulaski **Tennessee College of Applied Technology, Pulaski** 1233 East College Street PO Box 614 Pulaski, TN 38478 **Contact:** James Dixon, Director **E-mail:** james.dixon@ttcpulaski.edu **Tele.** (931) 424-4014 http://www.tcatpulaski.edu/	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. 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 **Imagine Solar** 4000 Caven Road, Austin, TX 78744 **Contact:** Alicia Cloud **Email:** info@imaginesolar.com; alisha.cloud@imaginesolar.com **Tele. (**888) 514-1972 www.imaginesolar.com	**PV100 Series: Photovoltaic System Design & Installation** (Formerly named PV201) This series of workshops meets the requirements to sit for the NABCEP PV Entry Level Exam and follows the ISPQ standards. Our expanded 48-hour PV100 Series supersedes our 40-hour PV201. The PV100 Series also includes hands-on labs including a utility-interactive installation and an off-grid installation. Our customers have always appreciated the hands-on components of our training so we include it in our entry-level training. The PV100 Series can be taken as three separate courses: PV150: Grid-Tied PV System Installation PV160: Grid-Tied PV System Design PV170: Off-Grid PV System Design and Installation: The complete series is required for the NABCEP PV Entry Level Exam. Therefore, upon completion of these courses, you can sit and take the NABCEP Entry Level PV Exam at a Computer Based Center authorized by NABCEP. Our workshop assumes no previous experience. It is appropriate for the serious non-technical beginner as well as electrical contractors, electricians, engineers, and entrepreneurs. Training modules include the following: The Photovoltaic Industry and the Qualified Solar Pro; Basics of Electricity; The Solar Resource; Site Assessments; Tools for the Solar Professional; System Components and Configurations; Cells, Modules, and Arrays: Specifications, Technologies, Vendor Comparisons; Batteries and Charge Controllers; Inverters: Types and Specifications; System Sizing and Design; Mechanical Integration; Electrical Integration: National Electric Code, Voltage Drop; Utility Interconnection; System Installation and Commissioning; Performance and Troubleshooting. Attendees of the complete PV100 Series will be provided the textbook titled Photovoltaic Systems by Jim Dunlop from American Technical Publishers as well as the ImagineSolar custom course materials.

	As an alternative, you may take our online course PV201e: PV System Design & Installation. Our online course covers the NABCEP PV Entry Level Learning Objectives but does not include hands-on labs. For the hands-on labs and the utility-interactive installation you can take PV201eLab. You will be provided the textbook titled Photovoltaic Systems by Jim Dunlop from American Technical Publishers for our online course PV201e.
TEXAS, Del Valle **SolPowerPeople, Inc.** 5035 Hwy 71 E Del Valle, TX 78617 **Contact**: Richard D. Stovall, CEO **email:** info@solpowerpeople.com **Tele.** (855) 765-7693 www.solpowerpeople.com	**SPV 2000/SPV3000 Accelerated PV Design & Installation Workshop:** The SPV2000/SPV3000 Accelerated PV Design & Installation Workshop implement a blended course model carefully designed to provide a solid foundation of knowledge coupled with advanced applied learning activities in a comprehensive conceptual and experiential learning format. This training intensive is designed for individuals seeking careers in the solar energy industry or who are interested in understanding what they need to be able to do to add solar PV related series to their existing home and./or business.
TEXAS, El Paso **El Paso Community College** 919 Hunter El Paso, TX 79915 **Contact**: Olga LValerio **email:** ovalerio@epcc.edu **Tele.** (915) 831- 2350 http://www.epcc.edu/ContinuingEd/ATC/Pages/default.aspx	The programs in Renewable Energy offered at Advanced Technology Center are an Associate's Degree in Applied Science and a one-year Certificate of Completion. The primary focus is on Photovoltaic (PV) Systems and Solar Thermal Systems because there is significant regional potential for solar energy development, but also includes an overview of other renewable energy sources. It prepares the student for entry-level positions in the field of PV and Solar Thermal installation and maintenance.
TEXAS, El Paso **El Paso Electricians JATC** 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, El Paso **International Business College** 5700 Cromo Drive El Paso, TX 79912	**Basics of Solar PV** (40 hours) is designed to provide an introduction to solar photovoltaics for individuals with or without construction, engineering, electrical, or plumbing experience and/or training. This course covers the topics of PV Markets and Applications; Safety Basics; Electricity Basics; Solar Energy

Contact: Denise Deeds **emails:** denise.deeds@ibcelpaso.edu **Tele.** (915) 842-0422 www.ibcelpaso.edu	Fundamentals; PV Module Fundamentals; System Components; PV System Sizing Principles; PV System Electrical Design; PV System Mechanical Design; and Performance Analysis, Maintenance and Troubleshooting. Graduates will be able to register for and take the NABCEP Solar PV Entry Level at IBC following course completion. **Construction Technology with a Solar Energy Specialty**, a nine-month program (1080 hours), is designed for individuals with no previous construction, electrical, plumbing or renewable energy/energy efficiency training. The course meets daily and offers theory and lab instruction in construction and overlays four modules in renewable and energy efficiency (solar PV, solar thermal, weatherization and lighting efficiency). Graduates will be eligible to sit for a number of tests in these fields, including the NABCEP Entry Level Exam. Courses include the basics of solar PV and advanced applied solar PV, including topics such as safety, system sizing, proper system installation, orientation, performance, maintenance, and troubleshooting. Students receive lectures and hands-on experience installing, troubleshooting, and maintaining solar PV equipment in various types of roofs (trainers), and participate in externships at local worksites in the subsectors of the clear energy industry.
TEXAS, Grand Prairie **North Texas Electrical JATC** 680 W. Tarrant RD Grand Prairie, TX 75050 **Contact**: Kim L. Allen, Training Director **emails:** kallen@ntejatc.org **Tele.** (972) 266-8383 ex. 102	This PV Entry Level Course covers the fundamentals, design and installation of Solar Photovoltaic (PV) Systems. It will include actual hands-on work with photovoltaic systems and equipment along with class you lectures. It is targeted towards Electrical Contractors, Journeyman, Instructors and Apprentices wanting to learn more about the installation and technology of PV systems. 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 **St. Philip's College** 1801 Martin Luther King Drive San Antonio, TX 78203 **Contact**: Dan Sherry **emails:** dsherry3@alamo.edu **Tele.** (210) 486-2125	**Energy Tech/Green Construction** This program prepares students for a career in the emerging energy industry. In addition to technical skills, students will develop basic industrial math, computer training, and safety skills essential to working in the energy field. Students will complete one the three technical skills tracks in Energy Management, Green Construction or Renewable Energy Transmission. The Green Construction Track prepares students to install solar panels, solar thermal/water systems, HVAC systems and teaches retrofitting techniques.

www.alamo.edu/spc	
UTAH, Cedar City **Southwest Applied Technology College** 500 W. 800 S. Cedar City, UT 84720 **Contact**: Mark Florence **Email:** mflorence@swatc.edu **Tele.** (435) 586-2899 http://www.swatc.edu/Renewable_Energy	**Solar Fundamentals** Solar Fundamentals I - This 60 hour course explores the basic principles of utility-interactive and stand-alone photovoltaic systems. Solar Fundamentals II - This 60 hour course covers the requirements of the National Electrical Code (NEC) in relation to utility-interactive and stand-alone photovoltaic systems. Training in each course consists of hands-on labs and a blend of classroom and/or online instruction. Upon completion of both courses, students will have covered the NABCEP PV Entry Level Learning Objectives and will be prepared to take the NABCEP Entry Level Exam.
UTAH, Kaysville **Davis Applied Technology College** 550 E 300 South Kaysville, UT 84037 **Contact**: Stacy Hatch **Email:** stacy.hatch@datc.edu **Tele.** (801) 593-2433 www.datc.edu	**Course description pending**
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**: Mia Roethlein, Project Manager **Email:** mroethlein@vtc.vsc.edu **Tele.** (802) 477-3783	**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.

www.vtc.edu	
VIRGINIA - Abingdon **Virginia Highlands Community College** 100 VHCC Drive Abingdon, VA 24210 **Contact**: Reva Russel **Email:** rrussell@vhcc.edu **Tele.** (276) 739-2475 **www.vhcc.edu**	**Energy Technology – AAS Degree** **3 Course:** ENE 120 – Soalr Power Photovoltaic and Thermal 4 credits, 90 hours (45 lecture, 45 Lab) ENE 110 – Solar Power Installations – 4 Credits 90 Hours (45 lecture, 45 Lab). ELE 157 Electricity Fundamentals 7 Credits, 105 Hours (45 Lecture, 60 Lab)
VIRGINIA- 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, Dublin **New River Community College** 5251 College Drive Dublin, VA 24084 **Contact/Instructor:** Keith McAllister **Email:** kmcallister@nr.edu **Tele:** (540) 674-3600	**ELE176 Introduction to Alternative Energy and ELE 177 Photovoltaic Energy Systems:** ELE176 Introduces Alternative Energy with an emphasis on Solar & Small wind Turbines technology, PV and Solar Thermal technology, solar applications, energy terminology, system components, site analysis, Solar system integration and system connections and small wind turbine site analysis. Lecture 2 hours, Lab 2 hours – 4hrs total/week. ELE177 – Site Surveys, installing system components, installing inverters and performing system sizing and system maintenance, different battery configurations, charge controllers, site

	safety, system design & layout, National Electric Code, component selection, wiring and installation technique. Lecture 3 hours, Lab 3 hours, 6 hours total/week (14 weeks).
VIRGINIA, Wytheville **Wytheville Community College** 1000 East Main Street Wytheville, VA 24382 **Contact/Instructor:** Angela G. Lawson **Email:** alawson@wcc.vccs.edu **Tele:** (276) 744-4973 **Web:** www.wcc.vccs.edu	**ENE 120-Soalr Power Photovoltaic and Thermal:** Within the Construction Tech. Alternative Energy specialization Diploma, Wytheville Community College has developed a "Solar Installer" career studies certificate with a focus on PV and Thermal Solar Power Installations. Integrated into that "Solar Installer" career studies certificate program us a single course (ENE 120) with specific competencies and objectives that include but are not limited to the required NABCEP Entry Level Learning Objectives. ENE 120 is an approved part of the Virginia Community College Mater Course file. The course studies production and conversion of electrical energy from modular to grid power systems, storage of energy, PV and thermal solar capture, residential and commercial storage applications. There is a pre-requisite electrical course or equivalent experience requirement for ENE 120.
WASHINGTON, Shoreline **Shoreline Community College** 16101 Greenwood Ave. North Science/Math Division Shoreline, WA 98133 **Contact:** Mike Nelson, Director-Solar/Zero Energy Technology Program **Email:** mikenelson@shoreline.edu **Tele.** (253) 396-8446 **www.shoreline.edu**	**Course description pending**
WEST VIRGINIA - Parkersburg **West Virginia University at Parkersburg** 300 Campus Drive Parkersburg, WV 26104 **Contact**: Gary Thompson **Email:** gary.thompson@mail.wvu.edu **Tele.** (304) 424-8000 www.wvup.edu	**Solar Energy Technology – 1 Year Certificate** The Solar Energy Technology Certificate Program at WVUP will prepare students for employment designing and installing solar electric systems, as well as integrating solar technologies into existing electrical systems.

WISCONSIN **NECA-IBEW Wisconsin JATCs** Local Unions 14, 127, 158, 159, 388, 430, 577, & 890 **Contact**: Clay Tschillard, Coordinator / Training Director **Email:** clay@wijatc.org **Tele.** (608) 221-3321 www.wijatc.org	This is a 45-hour comprehensive course covering the entire text of author Jim Dunlop's "Photovoltaic Systems". The curriculum used was developed by the NJATC in conjunction Jim Dunlop and combines a blend of classroom instruction and hands-on activity. Journeyman Electricians are instructed in all facets of PV installations, including solar theory, system design, safety, NEC Code, and troubleshooting. Due to the advanced nature of the course, it is limited to individuals possessing a journeyman electrician's certification, including a minimum of 10,000 hours of electrical construction experience. Upon successful completion of the NABCEP Entry Level Exam, participants will be awarded a Certificate of Completion by the NJATC.
WISCONSIN, 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, Custer **The Midwest Renewable Energy Association (MREA)** 7558 Deer Road Custer, WI 54423 **Contact**: Nicole Rice **Email:** Nicoler@midwestrenew.org **Tele.** (715) 592-6595 www.midwestrenew.org **ONLINE Options**	**All three of courses are required and available through the MREA either online or in person.** **Basic PV (PV 101)** - Teaches the basics of solar electric systems including PV system types, system component identification, best application and limitations of each system type, defining the solar window, system loads, and energy efficiency recommendations. **PV Site Assessment Training (PV 201)** - Teaches how to perform a PV site assessment for a home or small business. Covers site assessment tools, load analysis, array placement options, basic system sizing, cost estimates, PV system performance calculators, and invectives. **PV System Design (PV 202)** - Participants use example site assessments, PV system component design examples, and PV system case studies to learn about selecting equipment, system sizing, layout planning, array siting, and other design considerations. All three training courses are available online or in person.
WISCONSIN, Green Bay **Northeast Wisconsin Technical College** 2740 W. Mason Street Green Bay, WI 54307 **Contact**: Amy L. Kox **Email:** amy.kox@nwtc.edu **Tele.** (920) 498-6908	**Energy-Intro to Solar Electricity** is an overview of the use of sunlight to produce electricity and the practical and economic use of PV power systems. Learn the importance of energy efficiency and the economics of PV-generator hybrid designs. (3 credits.) **PV-Design & Site Assessment** will teach the steps to performing a site audit prior to installation of a PV system. Focus on defining the solar window, system site placement and sizing, lead analysis and energy

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