



Greater Philadelphia Innovation Cluster
for Energy-Efficient Buildings
A U.S. DOE Energy Innovation Hub



**Education and Workforce Programs Report
January 2012**

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for Energy-Efficient Buildings**

Task Area:
Education and Workforce Development

Author/Institution:
Tony Girifalco & Gary Hines/DVIRC

Background

The Greater Philadelphia Innovation Cluster (GPIC) for Energy-Efficient Buildings is a consortium of academic institutions, federal laboratories, global industry partners, regional economic development agencies and other stakeholders that joined forces to secure up to \$130 million in federal grants, including \$122 million from the Department of Energy to establish an Energy Innovation Hub. The Commonwealth of Pennsylvania has also committed \$30 million of new capital funding to support GPIC facilities at The Navy Yard. The funding will foster national energy independence and create quality jobs for the region.

The goals of GPIC, located at The Navy Yard in Philadelphia, are to improve energy efficiency and operability and reduce carbon emissions of new and existing buildings, and to stimulate private investment and quality job creation in the Greater Philadelphia region, the larger Mid-Atlantic region, and beyond. The GPIC will focus on full spectrum retrofit of existing average size commercial and multi-family residential buildings.

GPIC is supported by over 70 partners from industry associations, workforce investment boards, economic development agencies, banks and financial institutions and community organizations.

GPIC activities are organized into 6 task areas:

- Design Tools – The goal of this task is to deliver accessible and affordable, calibrated and validated computer based tools built on open architecture to support integrated design of energy efficient retrofit projects by architects and engineers focused on average size commercial and multi-family residential buildings.
- Integrated Technologies – The goal of this task is to develop and deliver optimal configurations of integrated technologies and system solutions for energy efficient retrofit of commercial buildings of varying functionality, size, and aspect ratio, as well as multi-family residential buildings.
- Policy, Markets and Behavior – The goal of this task group is to create public policy and business market environments that support full-spectrum energy efficient retrofit of average size commercial and multi-family residential buildings in Greater Philadelphia.
- Education and Workforce Development – The goal of this task is to ensure a skilled workforce at all levels in the energy efficient buildings sector in Greater Philadelphia.
- Deployment and Commercialization – The goals of this task are to transform the building industry from a serially fragmented method to an integrated systems approach and to create new jobs in Greater Philadelphia
- Collaborative Demonstration Projects – The goals of this task are to demonstrate performance of GPIC coordinated system integrated and operational technologies, policies, business models, workforce development approaches, and process integration methods in retrofitting of buildings at the Navy Yard and other sites in the Greater Philadelphia region.



Sponsorship and Reference Statement

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Credits

Special thanks to the GPIC Education and Workforce Task Team who all contributed substantially to this report.

Kevin Abbey

Associate Director, Energy Initiatives – Pennsylvania State University

Tony Girifalco

Executive Vice President – Delaware Valley Industrial Resource Center

Gary Hines

Project Manager – Delaware Valley Industrial Resource Center

Avis Ransom

Technical Analyst – Morgan State University

David Riley

Associate Professor of Architectural Engineering – Pennsylvania State University

Joseph Welsh

Chief Executive Officer – Collegiate Consortium for Workforce and Economic Development

Andrew Zwicker

Head, Science Education – Princeton Plastics Plasma Laboratories

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Context and Executive Summary

The broad goal of the GPIC Education and Workforce task is to ensure a skilled workforce at all levels in the energy efficient buildings sector in Greater Philadelphia. One of the first steps under the education task was to conduct a skills gap analysis to articulate the education and training needs of the market. It became clear, however, that the occupational classifications relating to the GPIC Hub — and the commercial EEB retrofit market — had not been clearly defined and, therefore, that the specific skill sets or competencies for jobs within a classification scheme could not be adequately articulated.

The education and workforce task team members were also aware that changes within the workforce development and education systems were already taking place as the traditional lines between occupations, particularly in the trades, were changing. Curriculum was being modified, the design and engineering enterprise was changing, operations and maintenance functions were becoming more complex, new energy-related educational programming was emerging, unions and associations were trying to keep pace with standards and certifications, and the energy efficiency services sector was gaining a life of its own. In short, we were (and are) dealing with a complex landscape with many moving parts and acknowledge that this report represents a snapshot of a moment in time. Knowledge of the existing training and education landscape will help us to organize our thinking and activities as we cultivate purposeful engagement with institutions and organizations here in the region and beyond.

Purpose

This report offers an inventory of the existing relevant educational programming available in the secondary system's technical schools, in the region's community colleges, and GPIC partner four-year institutions. It also offers an inventory of workforce development and training programs available through select initiatives such as the Energy Coordinating Agency and Sustainable Business Network. The report also includes some educational programming and credentialing available through select labor unions and business associations.

As an initial overview of existing education and workforce development programs relevant to the GPIC Hub, the report will give GPIC partners and other stakeholders a view of the current state of local education and training programs for energy efficiency in general and for EEB in particular. It has also helped to answer the following questions:

- *Is the education infrastructure in place to support the creation of jobs in energy efficient building retrofits?*
Yes, the facilities and foundations for training in this field are primed and ready. Many of the technical high schools as well as the colleges have building trades courses as well as engineering and design programs that could be adjusted to the EEB retrofit industry. Programs such as applied engineering, architecture, green building technology and energy programs are already in place at both secondary and postsecondary levels.
- *How is traditional technical and skilled labor education and training changing to support changes in the market?*
The education system is aware of the changing market for energy efficiency and sustainability. Some have programs in place, others are gearing up, and others are waiting to see what this market may bring in terms of jobs. The "Green" and "Sustainability" movements have fostered innovative programming.
- *How connected are the secondary and post-secondary educational pathways?*
Many of the schools throughout the region have long histories of collaboration on articulation agreements, with several pathways already connected. Most technical secondary institutions have some sort of formal or informal arrangements with community and 4-year schools for transfers and dual enrollment.
- *Which programs or institutions show the most promise for supporting the activities of the GPIC Hub?*
All of the schools and other organizations inventoried have a keen interest in GPIC-related activities and all have unique and valuable programs to offer. Having such a broad range of schools and institutions offering energy efficiency-related education and training will allow us to partner at many levels of the educational supply chain.
- *What else needs to be done to prepare our education and workforce systems to support this emerging industry?*
The most apparent need is for a sustained marketing and outreach campaign that can present the career and educational paths that lead to local jobs in the

EEB retrofit industry. More partnerships between business and education and workforce providers for curriculum revision, skills analysis, and general programming would provide huge benefits. The GPIC Task 5 Team should engage local educators and workforce professionals in all phases of the planning process for programming, the development of assessment tools, and the establishment of credentials. Focused outreach to traditionally underrepresented communities should remain a priority.

The report will add to the growing database of education and training programs related to energy efficiency, sustainability, and building sciences. We hope to include some of the information from the report as part of a larger database that could be accessed by companies and others looking for training programs to support the EEB and other energy-related training. We plan to use it as a starting point for a systems approach to education and training program development to support the GPIC Hub, and for the development of the EEB Assessment Center planned for year two.

The information included here will contribute to defining the relevant job families and skills required for different jobs in the EEB retrofit marketplace, and also help to identify those programs that show the most promise for supporting what will emerge as a high demand for technically proficient individuals across a broad spectrum of occupations.

As of this writing, GPIC representatives have just started a dialogue with the DOE Commercial Building Initiative to participate in a review of six job task analyses, including:

- *Building Energy Auditors*
- *Commissioning/Retro-Commissioning Authority*
- *Commercial Building Energy Modeler*
- *Energy/Sustainability Manager*
- *Facility Manager*
- *Operating Engineer/Building Technician*

In the near term, GPIC's workforce and education team will be focused on Building Energy Auditors and Operating Engineers/Building Technicians.

Audience

The primary audience for this report is the GPIC community including partners and members. Secondary audiences include the institutions and organizations profiled in the report, other education and workforce development organizations, training institutes and workforce investment boards.

Methodology

For the majority of institutions included here, DVIRC visited the institution or organization for a site visit and face-to-face interview with principals, executive directors, deans and training personnel to hear first-hand accounts of programs, enrollment, challenges and successes in the technical education community.

The survey/interview instrument sought to capture contact information, program descriptions, and other key qualitative data to begin to better understand the dynamics of the individual institutions and of the supply-side market as a whole.

Collecting information for this report took place in two phases. In Phase I we selected 25 schools and training organizations within the GPIC footprint to visit and interview, including secondary technical schools, community colleges, and independent non-profit education and training organizations. In Phase II we opted to focus on a sample of labor unions, on GPIC partner four-year post-secondary institutions, and on a small sample of other partners. Among the four-year institutions included are: Penn, Princeton, Purdue, Morgan State and Carnegie Mellon Universities, Virginia Tech, the New Jersey Institute of Technology.

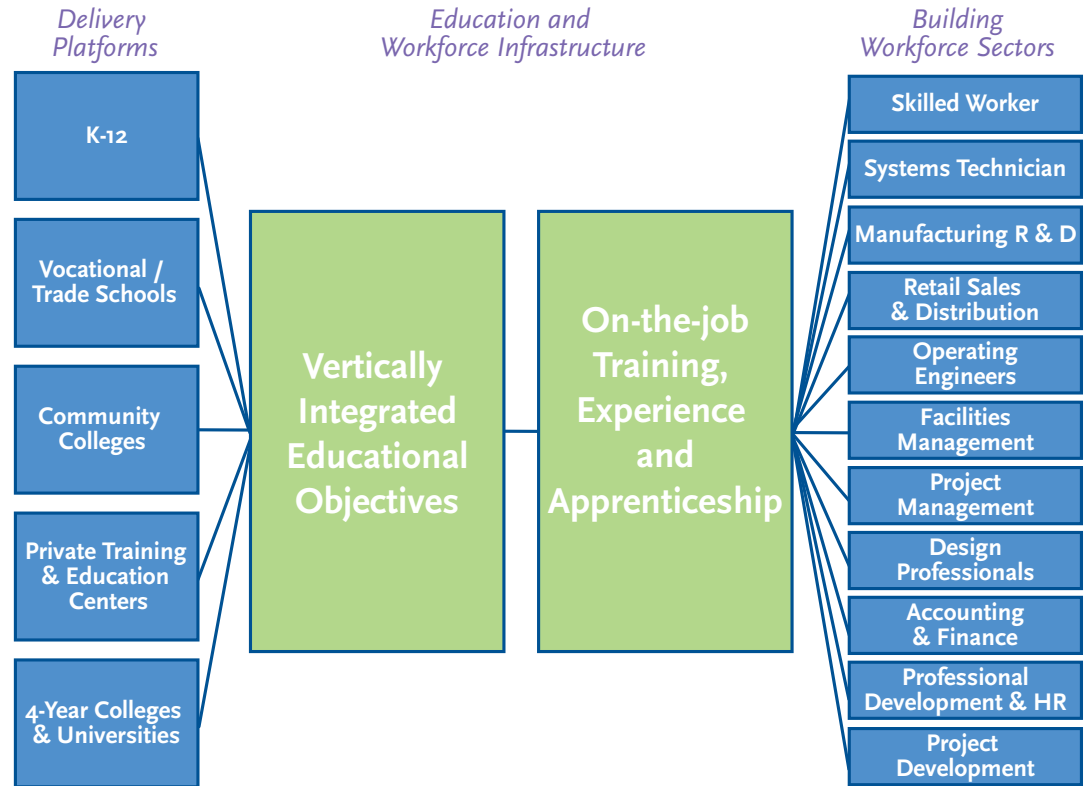
Market Limitations

Part of the challenge in this endeavor, here and elsewhere, has been clearly defining the playing field — an issue in general for this emerging field/sector. It remains challenging to sort out the various bits of work that have been done under the broad categories of Energy, Energy Efficiency, Weatherization, Sustainability, and Green. As a useful starting point we are including in this report the Energy Career Cluster Map developed by the Center for Energy Workforce Development. We also reference other documents and reports that have contributed to and advanced the conversation around education and workforce development for EEB.

Another challenge was to understand what was going on in the complex regional system of workforce development and education. Mindful that it is always easier (and less costly) to modify existing educational programming than to create new programming, we seek with this report to provide a baseline of information on the region's education and workforce development programs that can support the innovations coming out of the GPIC Hub.

Introduction

The following slide, which provides a high-level view of the supply-demand equation, was developed by Dr. David Riley Associate Professor in Penn State's Department of Architectural Engineering and Director of Penn State's Center for Sustainability.



High Performance Building Workforce Development

Through the development of this picture and ongoing discussions with educators and workforce professionals, the following observations have emerged to guide the work of this task in Year 2, with a focus on delivering education and training programs for building operators and building energy auditors:

- Energy efficiency workforce sector is larger than new building sector
- Education and workforce needs are vertically distributed across professional and skilled trades
- Trends in development of standards and increased numbers/types of credentials across professional and skilled trades
- Simultaneous need to address energy priorities and create jobs
- Climate of high unemployment, low confidence, failing green jobs programs
- Talent needed to feed new age of energy literacy and independence
- Existing workforce has experience and belief system that will create barriers to change

Looking Ahead. As we move into our second year of work we will focus on developing and utilizing key relationships with national organizations such as ASHRAE, BPI, the DOE-supported National Training Education Resource, and the Center for Energy Workforce Development. We are already working more closely with other GPIC task members to better understand the complexities and implications of their work and how they might inform our ongoing interactions with the workforce and education systems.

Many of the educational pathways to careers emerging in the EEB commercial retrofit space are STEM-related...and our existing system is not producing enough STEM graduates. Every recent report one can cite also documents the need for well-educated, cross-trained, and highly-skilled technicians. As the new commercial retrofit market emerges, we will need a public relations/education campaign to educate and inform multiple audiences—parents, students, teachers, counselors, school administrators, elected officials and the public at large—about the opportunities in this market. When we are successful, we will also need to weigh in on some of the broader public policy discussions around education in general and technical education in particular. When that time comes, we will be speaking from a deep base of experience with some of the smartest voices in the business.

Critical Gaps

The following chart, figure 1, was prepared by Dr. Dave Riley, Associate Professor of Architectural Engineering, Pennsylvania State University and outlines critical gaps in the high-performance building workforce.

Figure 1, Critical gaps in the high-performance building workforce.

Field	Description	Action / Strategy	Priority
Building Energy Evaluation / Auditing	Capable of performing screening audits and detailed existing building systems energy analysis	Develop three-tiered program in (1) fundamental, (2) systems specific, and (3) whole building energy auditing and analysis	High
Energy Economic Modeling and Analysis	Capable of integrating energy analysis, design tools lifecycle assessment, and financial modeling to produce investment-grade energy economic models	Expand programs supporting the education and training of energy modeling and analysis including a “teaching hospital” model to cultivate experience	Medium
Building Information Modeling	Capable of utilizing Building Information Modeling Tools effectively through the duration of planning, design, construction, and operation of facilities	Develop fundamental skills map, curriculum standards, certifications, and training programs, including online programs	Medium
Integrated Design Management	Capable of participating and/or leading the process of integrated design from the establishment of project priorities through building commissioning	Develop continuing education programs in Integrated Design Leadership aligned with PSU IPM-REST program	High
Power Systems Engineering	Capable of conceiving and designing integrated building power systems that include demand response controls, energy storage, and on-site power generation.	Coordinate with Grid Star Center, NECA/IBEW NETL, and NREL, and DoD efforts to cultivate smart grid, renewable energy, and power systems education and workforce development	Medium
Building Operator / Automation Technician	Capable of managing, diagnosing, and maintaining sensors and network peripherals required for the monitoring and control of high performance building systems	Cultivate 2+2 programs that expand existing training programs and strengthen career ladders focused on building systems controls	High
Electrical Systems Design and Construction	Capable of designing and installing new electrical power systems technologies such as on-site power generation systems, energy storage systems	Develop energy centric integrated program in building electrical systems design and construction	High
Mechanical Systems Design and Installation	Capable of designing and installing new mechanical systems technologies such as CHP, Solar heating and cooling, geothermal, dual stage heat pumps, adsorption chillers	Develop energy centric integrated program in building mechanical systems design and construction	Medium
General science and engineering	High school / vocational school graduates with strong STEM skills and contextual education in energy and building systems	Integrated STEM programs connected with all GPIC efforts and Sustainable Energy Charter School	High



Technical High Schools

BUCKS COUNTY TECHNICAL HIGH SCHOOL

Mission Statement

Our mission, in cooperation with participating school districts, is to prepare all students for careers, post-secondary education, and life-long learning, by providing knowledge and practical skills through high quality, integrated, standards-driven curriculum, and access to current technologies, work-related experiences, and partnerships within the community.

Profile

Bucks County Technical High School began in spirit in 1955 when seven school districts voted to support an area Technical School. The seven districts were Bensalem Township, Bristol Township, Falls Township, Lower Makefield Township, Yardley Borough, Tullytown Borough and Morrisville Borough. Shortly thereafter, a 47 acre site was chosen on Wistar Road in Fairless Hills, PA. The school also plays an active role in the community by providing adult education programs during the day and evening. Bucks County Technical High School is currently under the leadership of Dr. Leon Poeske, Administrative Director.

GPIC-Related Course Offerings

Building Trades

Students receive training in carpentry, masonry, plumbing and electricity both in layout and design and in remodeling and maintenance. They are taught to read blueprints, piping and wiring schematics, do estimating and costing. Classroom instruction is closely integrated with practical work in the Technical High School's unique house building facility. Graduates can enter the employ of contractors or proceed to study for a degree in construction management, building management or carpentry technology.

Carpentry

Curriculum covers basic mathematics, properties of materials and reading of prints, schedules and specifications. Carpentry laboratory activities include framing, sheathing, roofing, siding, interior and exterior finish work. The students also explore excavating and foundation layout, concrete forms, job planning and estimation. Graduates can enter apprenticeship programs or use their studies as a firm base for pursuing a degree in architecture.

Electrical Occupations Technology

Students are introduced to basic physics and mathematics; learn the principles of DC and AC circuits and how to interpret construction plans and electrical diagrams. They receive detailed practical instruction in residential, commercial and industrial applications and troubleshooting including wiring, metering, security systems, motors and controls. This comprehensive training prepares them to become journeymen electricians or progress to a degree in electrical engineering.

HVAC/Refrigeration

Students study basic physics and mathematics, heat transfer, pipefitting and reading of schematics. They are given extensive theoretical and practical instruction in domestic, commercial and industrial environmental control systems including protocols and safe measurement, handling and reclamation practices of refrigerants. Graduates can find wide employment opportunities or continue their higher education in related engineering programs.

Plumbing/Heating

Students prepare for a career as a plumber, pipe fitter, sprinkler fitter or drain cleaning mechanic. Instruction is given in principles of venting, water supply, drainage, heating, blueprint reading and plumbing codes. Hands-on work covers joining of copper, PVC, CPVC and cast iron soil pipe, installation and maintenance of dishwashers, garbage disposals, faucets and other fixtures. Graduates may enroll in apprenticeship programs or pursue a degree in chemical engineering.

Welding/Fabrication

Students learn basic and advanced blueprint reading, fabrication, and ferrous and non-ferrous metallurgy. Laboratory instruction includes shielded metal arc welding, oxyacetylene welding MIG and TIG techniques. Theoretical and practical studies cover mild and alloy steels, aluminum, titanium and other exotic metals. Students learn the basics of heat-treating and non-destructive testing and inspection. Instruction meets AWS standards. Graduates can enter apprenticeship programs or go on to degree studies in metallurgy or mechanical engineering.

Civil Engineering Technology

Students learn the basics of surveying, land improvement and building. Studies include mathematics, physics, civil drawing, blueprint reading, coordinate geometry, storm water management, environmental engineering office procedures is combined with extensive laboratory, drafting and fieldwork. Graduates can obtain employment on surveying or construction teams in private or public practice or go on to a college degree in Civil Engineering.

Electronics Technology/Green Energy Technologies

Students can empower themselves with three (3) green technology skill sets and master the business of Alternative Energy. The course in Renewable Energy includes Photovoltaic (Solar) Installer/Integrator, Small Wind Installer, and a comprehensive hands-on study in the field of Computer Networking, Computer Maintenance, Mechatronics, and Electronics Technology. This 4-year course puts students on the fast track to a Green Collar job. Students can become one of the first technicians to have a complete skill set for green jobs. OSHA Certification is also covered during the first year of the program.

Contact

Rich Knorr

Bucks County Technical High School
610 Wistar Road
Fairless Hills, PA 19030
215-949-1700
www.bcths.com

Mission Statement

The mission of Middle Bucks Institute of Technology as the regional career development and technology center is to develop in youth and adults, through a rigorous and integrated educational experience, the competencies required for higher education and work.

Profile

Middle Bucks Institute of Technology is a regional leader in providing career development, advanced technical training, and pre-professional programs for high school students and adults. Students in grades 10, 11, & 12 who reside in the Centennial, Central Bucks, Council Rock, or New Hope-Solebury School Districts can attend MBIT. They also have adult students in our day programs, as space permits. In addition, they offer adult continuing education evening courses.

GPIC-Related Course Offerings

Buildings and Facilities Program

The Building and Facilities Occupations program prepares students for career paths and employment opportunities in the construction industry through technical knowledge and skills in the building, repair, and general maintenance of residential buildings and other structures. The program provides instruction in a number of the construction trades with a focus on all systems in a physical structure. The instruction includes the basics of framing, finish carpentry, millwork, plumbing, electricity, masonry, concrete forms, tile setting, installing hardware, heating, ventilation, waterproofing, roofing, siding, drywall, painting, and record keeping. Students also learn to use hand and power tools, construction materials, estimating, blueprint reading, and construction safety. Graduates of this program are prepared for employment in the construction fields or may pursue more specialized training through an apprenticeship and/or post-secondary education.

Construction Carpentry

This program prepares students in all phases of building construction including layout of the site, footing and foundation construction, framing systems, exterior finishes, insulation, drywall, finish carpentry and cabinet installations, all with emphasis on residential home construction. Students also learn the proper use of hand and power tools, construction materials, estimating, blueprint reading, and construction safety. A full-scale student-built house is constructed each year as a project where advanced level students bring all their skills together as a culminating activity. Students will work in teams and under a variety of real occupational conditions. Clustered learning experiences are offered in collaboration with the Electrical & Network Cabling, Drafting and Design Technology, HVAC/Plumbing, and Practical Environmental Landscaping pathways as part of the Architecture & Construction career cluster. Students completing this program will be prepared to begin entry-level employment in construction carpentry and related trade areas. Students will also have the technical skills to pursue an associate or baccalaureate degree in construction-related fields such as construction technology.

Drafting & Design Technology

This program prepares individuals to use drafting and design skills and to apply technical knowledge and skills as each relates to gathering and translating data or specifications. This course covers basic aspects of planning, preparing, and interpreting mechanical, architectural, structural, civil, electrical/electronic, topographical, piping, tool and die, and other drawings and sketches used in various architectural and engineering fields. Instruction is provided in manual drawing and computer-aided drafting (CAD) techniques using AutoCAD Release 2011 and Inventor Professional 2011; the use of reproduction materials, equipment and processes; the preparation of specifications; the development of detailed drawings indicating dimensions, tolerances, fasteners, joint requirements, and other engineering data; and the development of scale models. Students complete an architectural house project, which includes working drawings, specifications, 3-dimensional perspective drawings, and scale models. Mechanical drawings include multi-view, section and revolutions, pictorial and working drawings. Each student develops a professional portfolio including pencil drawings, computer-generated drawings, and scale models. Clustered learning experiences are offered in collaboration with the Construction Carpentry, HVAC / Plumbing, Electrical and Network Cabling, and Practical Environmental Landscaping pathways as part of the Architecture & Construction career cluster. This program is designed for students who plan to pursue an Associate or Bachelor degree in engineering or architecture. Students are also provided shadowing and/or paid summer internship experiences.

Electrical & Network Cabling

This program prepares individuals to apply technical knowledge and skills necessary to lay out, assemble, install, operate, maintain, test and repair electrically-energized residential, commercial and industrial systems, DC and AC motors, generators, transformers, controls, programmable logic controllers, and electrical distribution panels. Instruction emphasizes the application of mathematics and science, electron theory and Ohm's Law. The program includes instruction in single and three phase, delta and wye systems; both low (110 v. - 220 v.) and high voltages (440 v. and higher); reading and interpretation of commercial and residential construction wiring codes and specifications (i.e., National Electrical Code); installation and maintenance of wiring; service; and distribution networks within large construction complexes. Clustered learning experiences are offered in collaboration with the Construction Carpentry, Drafting and Design Technology, HVAC/Plumbing, and Practical Environmental Landscaping pathways as part of the Architecture & Construction career cluster. Students will be prepared for entry-level employment in the electrical and cabling industry in residential, commercial and industrial settings. The program provides an excellent foundation of technical knowledge for college and/or direct employment.

Engineering-Related Technology

This program provides the college-bound student with preprofessional experiences in the field of engineering and related technologies. The newest curricular program in this pathway is Project Lead the Way and the Amatrol Hands-On Learning System. Project Lead the Way is a rigorous sequence of courses that allows students to develop skills in engineering and engineering technology. Exposure to Principles of Engineering and Introduction to Engineering Design helps students prepare to enter a two or four-year college or technical school. The Amatrol System helps the student understand the practical side of engineering related technology by utilizing hands-on skills. This project-based curriculum challenges students to use mathematical, scientific, and technological principles to solve real-world problems. The broader ERT curriculum consists of a series of courses that expose students to the various disciplines of engineering, including Civil Engineering; Electrical and Electronic Engineering; Design Engineering; Industrial, Manufacturing and Mechanical Engineering; Chemical Engineering; Aerospace Engineering; and Computer and Network Engineering. Students will apply advanced math and physics concepts to engineering problems. They will study electro-mechanical systems and robotics, electrical and electronic theory, thermal heat, and fluid and pneumatic power. Students will learn to use a variety of engineering tools, including software applications for design, statistical and data analysis, project management, presentation, and reporting. In addition, students will use laboratory equipment for testing and measurement. Students will learn the problem-solving process, to think critically, and work in teams. They will also have the opportunity to participate in engineering competitions. Clustered learning experiences are offered in collaboration with the Precision Machining Technology and Welding Technology pathways as part of the Engineering & Manufacturing career cluster. Students can gain practical work-based experiences through shadowing and paid summer internships and earn college credits. In the third year, seniors may continue their study of engineering by completing Level 3 of ERT, where they will complete specialized engineering projects, or, if qualified, opt for the Penn State University/MBIT dual enrollment courses. Engineering Related Technology is weighted as an accelerated course for Council Rock students.

HVAC/Plumbing

The HVAC (Heating, Ventilation, and Air Conditioning) and Plumbing Technology program has been designed around a business/industry and national skill standards model. This program uses project-based methods and national performance standards to instruct and evaluate students in a variety of careers in the mechanical and building maintenance industries. Students receive a highly technical instructional program that prepares them for an entry-level technician position using their academic and technical knowledge and skills to install, service and maintain heating, air conditioning, and plumbing systems. Instruction includes daily theory and hands-on application of basic principles of heating, ventilating, air conditioning, refrigeration and plumbing systems; Installation of rough-in plumbing system in frame construction and installation of rough-in plumbing system in ground; installation of residential plumbing fixtures, garbage disposals, kitchen and bath faucets, hot water heaters, gas fuel piping; installation of residential cooling systems; installation of residential heating systems; installation of refrigeration systems; blueprint reading; drain cleaning methods; HVAC trouble shooting methods and component replacement. Instruction also includes the use of ICC 2012 code books for plumbing, mechanical, and fuel/flue gas piping, basic hand tools, power tools and power equipment, refrigerant recovery equipment, manifold gauges, digital multi-meters and testing equipment.

Welding Technology

This instructional program prepares students in oxy/fuel, shielded metal arc, gas metal arc, gas tungsten arc, flux core, carbon arc, plasma cutting, flame cutting, and brazing using manual and semi-automatic welding processes. Clustered learning experiences are offered in collaboration with the Engineering Related Technology and Precision Machining Technology pathways as part of the Engineering & Manufacturing career cluster. Students learn about the types, sizes and uses of electrodes and welding rods, welding symbols, use of measuring instruments, hand tools, portable grinders, metallurgy, blueprint reading, electrical principles, layout and design, fabrication, practical problems in math, preparation of material lists, cost estimating and methods of quality assurance. Quality control inspections include the use of destructive and non-destructive testing equipment, hardness testing, dye penetrant and magnaflux. The welding standards and procedures established by the American Welding Society (AWS), American Society of Mechanical Engineers (ASME), the American Bureau of Ships (ABS), the American Petroleum Institute (API), and safety practices outlined in the American National Standards Institute (ANSI Z49.1) codebook will be practiced. Students may pursue advanced studies at the postsecondary level in fields such as metallurgy, welding engineering technology, quality control and inspection.

Certifications

Certifications: Through the collaborative efforts of the Residential Construction Academy (RCA) and MBIT, the RCA Program introduces students to the building trades while guiding them in the development of essential Construction Carpentry workplace skills and attitudes. Students can complete the RCA Training Program that culminates in a national registry of students who have successfully completed the Program. The RCA works jointly with the National Association of Homebuilders (NAHB) and the Home Builders Institute (HBI) to create the national standards for the Construction Carpentry trade. The national registry of students who have successfully completed the RCA Program provides the students the opportunity to access and verify skills and competencies achieved. The registry links construction employers and qualified potential employees to an on-line database to assist students in job searches and employment opportunities. In addition, students will complete the CareerSafe OSHA Safety Certification, which provides students with 10 hours of OSHA recognized safety and health education training.

Contact

Michael Sykes

Middle Bucks Institute of Technology, Warwick Township
2740 Old York Road
Jamison, PA 18929
215-343-2480
www.mbit.org

UPPER BUCKS COUNTY TECHNICAL SCHOOL

Mission Statement

The mission of the Upper Bucks County Technical High School is to educate students for successful careers and inspire lifelong learning in a challenging and changing global economy.

Profile

UBCTS serves the three sending districts of Palisades, Pennridge, and Quakertown and is open to students in grades 9-12. Students attend either morning or afternoon sessions at UBCTS and attend their assigned high school for academic classes during the other half of the day. Nineteen programs of study are offered at the school. Following graduation from the programs, students will attend post-secondary education, find employment in the field of study, or could choose to enter the military.

GPIC-Related Course Offerings

Construction Technology

Construction Technology offers students the basic skills that are important to woodworking, electricity, plumbing and air conditioning. These jobs are needed to construct and maintain buildings and closely interact with each other. This class gives students the opportunity to explore the construction trades with the option of transferring to a specific construction program.

Electrical Technology

This program incorporates theory and practical experience in generating and transmitting electricity. Students install and maintain communication, security and other electrical systems, using both AC and DC circuits. Students are taught residential wiring and learn how a home is wired from start to finish. In conjunction with these wiring techniques, the National Electrical Code is also taught. Electricity is used in commercial and industrial systems as well. These areas require such skills as blueprint reading, concepts of motors and generators, transformer work and working with motor control circuits. The electricity laboratory boasts a high tech array of solid state and conventional motor control training systems.

Plumbing and Heating Technology

Trained workers in the heating and plumbing fields are in high demand in today's world. The Heating and Plumbing field has been established by the Federal Government as a "Bright Outlook" field meaning employment is expected to grow rapidly for the next several years and will have large amounts of openings including in areas of new and emerging occupations. Students will learn how to install heating systems such as boilers, furnaces, and heat pumps. Students will also assemble, install and repair pipes, plumbing fixtures, and drainage systems according to specifications and State or National plumbing codes. Students will also design and install all heating and plumbing needs for the student-built house project.

Welding and Fabrication Technology

Trained workers in the heating and plumbing fields are in high demand in today's world. The Heating and Plumbing field has been established by the Federal Government as a "Bright Outlook" field meaning employment is expected to grow rapidly for the next several years and will have large amounts of openings including in areas of new and emerging occupations. Students will learn how to install heating systems such as boilers, furnaces, and heat pumps. Students will also assemble, install and repair pipes, plumbing fixtures, and drainage systems according to specifications and State or National plumbing codes. Students will also design and install all heating and plumbing needs for the student-built house project.

Contact

Mike Galler

Upper Bucks County Technical School
3115 Ridge Road
Perkasie, PA 18944
215-795-2911
www.ubtech.org

CHESTER COUNTY INTERMEDIATE UNIT

Mission Statement

The Chester County Intermediate Unit is a dynamic educational service agency providing quality, innovative and cost-effective programs to enhance the lives of students and members of our communities.

Profile

The Chester County Intermediate Unit provides services to the 12 school districts in Chester County. This includes services to nearly 85,000 public and non-public school students and over 6,000 educators. CCIU's major services include: special education and compensatory education programs; career, technical and customized education; mentor training and staff development; technology initiatives; consortia for school business operations; and curriculum services. The Chester County Intermediate Unit is one of 29 regional educational agencies established by law in Pennsylvania in 1971. Working between the Pennsylvania State Department of Education and the local school districts, the Intermediate Unit's mission is to provide services that can be offered most economically at the regional level.

GPIC-Related Course Offerings

Carpentry and Cabinetmaking

This program provides students with the skills necessary to find employment in residential construction and home improvement. The rough carpentry component provides instruction in the rough layout of walls, roof rafters, stairs and floors. The finished carpentry component provides instruction in the installation of doors, windows, trim and other close tolerance work.

The cabinetmaking course covers construction of cabinets and furniture, including the use of laminates. A major focus of the cabinetmaking program is the construction of the joints required in fine cabinetry and furniture construction. Students study blueprint reading, construction methods and estimating, materials selection, and the safe use of hand and power tools. Students are responsible for the completion of hands-on carpentry and cabinetmaking projects from start to finish.

Electrical Occupations

The three-level Electrical Occupations course challenges students with electrical theory and trouble-shooting concepts. Students study residential and commercial systems installations; electrical motor controls including state-of-the-art programmable logic controllers; the National Electrical Code; OSHA requirements; a proper work ethic; and, job safety. Electrical theory instruction emphasizes the scientific, mathematical, and environmental concepts of the electrical industry. The customized classroom Web site allows students and parents to access information and lessons anytime, anywhere.

HVAC/Refrigeration Technology

The HVAC/Refrigeration Technology program provides students with the opportunity to learn how to install, maintain, and troubleshoot a wide range of heating, ventilation, cooling, and refrigeration systems. The HVAC/Refrigeration Technology program provides students with the opportunity to install, maintain, and troubleshoot a wide range of heating, ventilation, cooling, and refrigeration systems. Classroom presentations are reinforced by hands-on shop projects. Basic electrical and control circuit concepts are taught and then applied.

Contact

Alan Slobojan

Chester County Intermediate Unit
455 Boot Road
Downingtown, PA 19335
484-237-5000
www.cciu.org

Mission Statement

Guided by industry professionals, Delaware County Technical Schools prepare today's students for tomorrow's opportunities by providing innovative, meaningful technical training, a foundation for life-long learning and marketable credentials for high-wage, high demand careers.

Profile

Delaware County Technical High Schools have two locations, Aston and Folcroft Campus. Students from the fifteen (15) area school districts have the opportunity to enhance their educational program with career and technical experiences that are directly connected to the real world. Business and Industry members review and update the career and technical education (CTE) programs offered by DCTS on a yearly basis.

GPIC-Related Course Offerings

Building Trades

Practical experience and classroom training prepares students enrolled in the Building Trades program for employment in general construction or property maintenance. Students are taught carpentry, masonry, plumbing, roofing, drywall application, painting, and framing/finishing. They learn safety standard compliance, tool and equipment identification, communication skills and employability skills, with a strong emphasis places on math and writing. Course content is relevant to commercial and industrial construction needs. DCTS instructors are Green Advantage certified and best able to prepare students for technologies and practices used for today's LEED construction.

Carpentry

DCTS faculty are NCCER and Green Advantage® certified, providing students with opportunities to earn professional certifications while exploring new technique and trends in green building and LEED® design. Students learn building layout, framing, roofing, windows, doors, and trim. On-site projects include sills, floor joists, stud walls, ceiling joists, rafters and a variety of materials. Once students successfully complete each module and pass their test, their information is recorded in the NCCER National registry. Upon graduation, they can continue their education through local union apprenticeships, a variety of partnering college programs, or the Association of Builders and Contractors.

Electrical Construction Technology

This industrial and residential electrical program introduces students to the basic concepts of residential and commercial wiring. With an emphasis on safety, students install circuits, switches, conductors, circuit breakers and other electrical devices. Topics covered include materials, supplies, tools, codes, blue print reading and low voltage wiring. Skills are taught in compliance with the National electrical Code (NEC) industry standards and National Center for Construction Education and Research (NCCER). Students begin working toward their NCCER certifications immediately.

HVAC

HVAC professionals have a central role in helping to make homes and buildings more energy efficient. DCTS students can earn college credits as well as their Environmental Protection Agency (EPA) 608 certification. Students learn system design, installation, repair and maintenance of commercial, industrial and residential HVAC Systems. The course is taught in compliance with the standards established by the National Association for Testing Excellence (NATE) and the Air Conditioning Contractors of America (ACCA). Students who opt to enter the ACCA apprenticeship program at the minimum age of 16 earn up to 9 college credits at DCCC, and work 500 hours for an ACCA contractor (paid employment) will be eligible for completion of one year of a four year apprenticeship program. Upon graduation, students will be offered full-time employment with ACCA contractor and enter as a second year apprentice.

Plumbing Apprenticeship Program

Plumbing Apprenticeship is a structured system of training designed to prepare individuals for skilled occupations. It combines on-the-job training under the supervision of experienced master plumbers with related classroom instruction. Apprentices who successfully complete the prescribed number of hours of training in an apprenticeship program become eligible to take the journeyman's test and become journeyman plumbers.

Certifications

- OSHA safety Certification
- EPA-608 (environmental Protection Agency) Certification
- PA skills Certificate

Contact

Phillip Lachimia

Delaware County Intermediate Unit
200 Yale Avenue
Morton, PA 19070
484-423-7001
www.dciu.org



THE WILLIAMSON FREE SCHOOL OF MECHANICAL TRADES

Mission Statement

Begun in the 19th century, Williamson still provides a free, quality trade and technical education to qualified young men and continues to upgrade its programs to meet the current challenges of advancing technology.

The Williamson Free School of Mechanical Trades believes that the ideals upon which Isaiah V. Williamson founded the School are as valid and relevant today as when the School was founded in 1888. In its beliefs, Williamson remains committed to these ideals.

Profile

Williamson takes a unique approach to occupational education. Over the course of three years at the School, students receive a broad education that includes study of trade and technical theory in the classroom and realistic work projects. Students also receive academic instruction that is designed to contribute to their career success. This well-rounded training is intended to provide graduates with the skills necessary for success in a wide variety of career options, from positions in the trade and technical fields to employment as small business owners.

GPIC-Related Course Offerings

Carpentry

Construction Technology, Carpentry Emphasis - Associate in Specialized Technology Degree

This program is intended for students interested in careers as a job site foreman, construction superintendent, project manager, front office administrator, or owner of a contracting firm. Students in this program receive the same theory instruction and hand skill training for building construction as taught in the Craftsman Diploma Program for Carpentry. In addition, students in this program also take courses in the technical, business, logistical, and management aspects of the construction industry to prepare them better to advance into supervisory or administrative positions or to run their own businesses. Graduates should be able to enter the work force at the advanced carpenter apprentice level and find work with contractors doing framing and finish work. With more on-the-job experience, they should be able to progress quickly to the journeyman, foreman, and supervisor levels or to front office assignments as estimators, schedulers, or material managers.

Masonry

Construction Technology, Masonry Emphasis - Associate in Specialized Technology Degree

This program is intended for students interested in a career in project supervision, construction management, front-office administration, or owning and operating a private contracting firm. Students in this program learn masonry skills, but also take additional courses in the technical, business, logistical, and management aspects of the construction industry so that they are better prepared to advance into supervisory or administrative positions in large construction firms or to run their own businesses. The program covers the process and procedures required for carrying out construction projects from start to finish including reading blueprints and specifications, estimating labor and material costs, and complying with building permit requirements, mandatory site tests, and bidding, bonding, and contracting procedures. Graduates should be able to enter the work force at the advanced mason apprentice level and find work with contractors as masons, tile setters, and concrete workers. With more on-the-job experience, they should be able to progress quickly to the journeyman, foreman, and supervisor levels or to front office assignments as estimators, schedulers, or material managers.

Paintings and Coatings Technology

Associate in Specialized Technology

Glenn E. Stevick Paint and Coatings Technology Program is designed to offer the student an opportunity to learn the basic knowledge and proper application of protective coating systems, protection of various surfaces, and the prevention of corrosion and other surface deterioration.

The program covers surface preparation (hand tool preparation, power tool cleaning, and sand blasting), application of architectural coatings (coverings for attractiveness), and protective coatings (coverings to protect wood, metal, and concrete surfaces from deterioration). Students also learn to layout and paint signs, mix colors, prepare surfaces, and apply wall coverings.

Instructors cover such theoretical aspects of the trade as color utilization, the manufacture of surface coatings, chemical makeup of coatings related to durability and failure, and business and management practices in the industry, including administrative requirements, office procedures, job estimating, business ethics, purchasing of materials, and principles of successful supervision. Other topics include interior and exterior painting, sign construction, scaffolding, ladder utilization, and accident prevention. Tool skills, such as the use of brushes, rollers, and sprayers, are developed through hands-on training in the shop and on actual painting and wall covering projects on-campus and for nearby charitable organizations.

The objective of this program is to prepare students for the challenging task of protecting industrial and commercial infrastructures. Applying the skills and education received in their painting and wall covering instruction, and their theoretical training in metallurgy, structural coatings, and corrosion control, graduates of this program will work to protect industrial plant sites, roadways and bridges, commercial buildings, and maritime structures and vessels.

Students gain the necessary knowledge to enter the work force at the advanced painter's apprentice level and to prepare for careers as painters, wall coverers, salesmen, estimators, project supervisors, and owners/operators of their own businesses; they may also be able to work in the corrosion control field in entry-level management positions as construction and maintenance assistant managers, manufacturers of protective coatings, project managers and estimators for industrial and commercial maintenance contractors, quality control and quality assurance managers, and positions with technical inspection firms.

Power Plant Technology *Associate in Specialized Technology Degree*

Through the operation of the School power plant and maintenance of its utilities, students gain valuable practical experience preparing them for positions in the power and utilities industries. Students take turns with shift work, which includes readings and adjustments, start-up and shutdown of plant equipment, daily water treatment tests, and mechanical and electrical maintenance.

Students also learn the proper operation, maintenance, and testing of boilers, turbines, diesel engines, electric generators, switch gear, pumps and other auxiliary equipment, as well as the theory of nuclear, fossil fuel, hydroelectric and other systems of power generation. The NUS Training Corporation's video-based power plant training program has been incorporated as part of the technical curriculum. The basic principles of

electricity, electrical power, motor controls, wiring diagrams, engineering mechanics, and mechanical and electrical systems are also covered, along with accident prevention, foremanship, and management. Additional courses to strengthen students' knowledge and skills include boiler/turbine instrumentation, welding, and metal survey. On an annual basis, students have participated in a power plant maintenance shutdown at a local refuse-to-steam plant.

Graduates are employed by utilities, industrial power facilities, refineries, manufacturers, and consulting firms as power plant operators, stationary engineers, field service technicians, instrumentation and controls technicians, and electrical maintenance technicians. The level of occupation would include junior technical assistant level, apprentice engineer, and/or entry-level management positions. This program also provides a sound base for further education in engineering.

Contact

Joseph Beaudry

The Williamson Free School of Mechanical Trades
106 S. New Middleton Road
Media, PA 19063
610-566-1776
www.williamson.edu

CENTRAL MONTCO TECHNICAL HIGH SCHOOL

Mission Statement

Students who attend the Central Montco Technical High School have the opportunity to get a head start on a technical career. The head start occurs through a process known as articulation via a program referred to as Tech Prep. It is a career preparation through articulation and advanced placement. The Tech Prep program is designed to prepare students to enter specific programs of study. The College Prep Programs of study focus on academic and technical preparation with a course of study that combines two or four years of secondary education with two or more years of post-secondary education.

Profile

Programs at Central Montco Technical High School are designed for the college-bound student as well as those who intend to enter the workforce after graduation. Sixty-five percent of students continue their education after high school at some of the finest colleges and technical schools in the country. In fact, many of the programs offer college credit for work done while in high school.

Each occupational area at the Central Montco Technical High School has an employee-based Occupational Advisory Committee which advises and makes recommendations to the teachers in school matters as curriculum, equipment and job placement. Through their input, curriculum is continually revised to relate to current employer needs. Over 125 employers participate in these committees.

GPIC-Related Course Offerings

Construction Technology

The Construction Technology Program is an excellent option for students interested in a career related to residential and commercial construction. This program includes studies in Carpentry, Masonry, Electricity, Plumbing and HVAC (Heating, Ventilation, and Air Conditioning). The first and second level students rotate through each of the construction trade laboratories, providing exposure to the skills required for success in each occupation. In the third year, the student has the option of remaining in the rotation or selecting a major for the year. This major can be incorporated with work-based learning in a paid or unpaid position.

Engineering Technology

The Engineering Technology program is geared towards students that enjoy design, technical sketching, invention and hands-on. Any student considering a career in design, architecture or engineering will gain immediate entry-level employability skills and a solid foundation for continued studies. Students in the program may pursue two general tracks: architectural and/or mechanical. The architectural track covers the fundamentals of residential design. The mechanical track focuses on basic design and manufacturing processes integrated with CNC (Computer Numeric Control) lathe and milling machines. CAD (Computer-Aided Design) software is used to generate drawings of structures and components with an emphasis on modeling and other hands-on projects.

Contact

Walter Staub

Central Montco Technical High School
821 Plymouth Road
Plymouth Meeting, PA 19462
610-277-2301
www.cmths.org

EASTERN CENTER FOR ARTS AND TECHNOLOGY

Mission Statement

The mission of Eastern Center for Arts and Technology, a leader in technology and in developing innovative, responsive programs, is to equip all students with the skills, knowledge and attitudes necessary to select, enter and succeed in a career, and to anticipate and adapt to change by providing high-quality technical instruction and specialized services.

Profile

Eastern offers high-quality continuously evaluated and updated technical instruction, leadership opportunities and specialized services. Our programs respond to the needs of students and business and industry to provide an environment where students can make career decisions, acquire competitive skills and prepare themselves for success in higher education. EASTERN is accredited by the Middle States Association of College and Schools Commission on Secondary Schools.

GPIC-Related Course Offerings

Construction Technology

Curriculum includes blueprint reading, planning and estimating along with experience in the installation of formwork; framing; finishing; and stair, rafter and roof construction. Higher education can lead to such careers as architecture, civil or architectural engineering, general contracting, surveying, and construction management.

Electrical Technology

Training is provided in residential, commercial and light industrial electrical applications, as well as data cabling and base fiber optic installation. Students receive 10 hours of Occupational Safety and Health Administration (OSHA) training to maintain a safe and healthy work environment. Higher education can lead to such careers as electrical engineering, residential electrician, and commercial electrician. Post-secondary apprenticeships can lead to a Journeyman's certificate.

HVAC

Curriculum includes heating and air conditioning that requires an understanding of gas laws, pressure/temperature, relationships, proper use of tools, electricity needed for the service technician and an introduction to hydronics. Higher education can lead to such careers as residential heating, air conditioning, mechanical technology or engineering.

Welding Technology

Curriculum covers properties of different types of metals and how to join them, blueprint reading, fabrication, testing, inspection, and quality control. Higher education can lead to such careers as mechanical, aerospace or industrial engineering; physical metallurgy; welding engineering; and aerospace/railroad/ship construction.

Contact

Kurt Adam

Eastern Center for Arts and Technology
3075 Terwood Road
Willow Grove, PA 19090
215-784-4800
www.eastech.org

WESTERN MONTGOMERY CAREER AND TECHNICAL CENTER

Mission Statement

The Mission of the Western Montgomery Career and Technology Center is to prepare quality citizens for lifelong productivity in a challenging world by forming innovative partnerships among family, school and community.

Profile

In addition to preparation for direct entry into the workforce, WMCTC students are prepared to enroll in college studies. Many two and four year institutions offer programs of study which complement the occupational and technical areas offered at WMCTC.

GPIC-Related Course Offerings

Carpentry

The Carpentry Program is designed to prepare students for entry level employment and/or career education at the college level. The program of instruction and training takes place at the on-site building project as well as in the shop and classroom on the WMCTC Campus. Students begin by learning the basic skills of Carpentry and Cabinet-making through hands-on experiences in residential construction. Cooperative Education and Apprentice employment opportunities are made available when the student is ready. In the final semester, students are prepared for further education with an introduction to construction management.

Electro-Mechanical

This program has been developed to give students entry level skills and knowledge required for employment in today's residential and commercial wiring and industrial maintenance. These skills are acquired through a combination of theory lessons, classroom training on simulation equipment, and actual real-life experiences on the WMCTC House Building Project.

The program content consists of instruction in: electrical theory, National Electrical Code, residential wiring techniques, commercial wiring techniques, electrical maintenance, industrial motor control and basic electronics: pneumatics and hydraulics. It is recommended that a student have a strong background in Algebra, Geometry, Basic Science, and Reading. In addition, correct color vision is very important, and the student should have good physical strength with no fear of heights. Personal safety, a good customer service attitude, pride in workmanship, and job seeking skills are also stressed as part of this curriculum.

HVAC

This program provides knowledge and skills training in: air conditioning, steam and hydraulic heating, temperature and humidity control, air circulation, duct and pipe system design and layout, thermostats, ventilating equipment, automatic controls, zoning controls, air and water circulators. Plumbing, electrical wiring, refrigeration technology, refrigerant recovery and management, and blueprint reading will be introduced as well. Students will also learn pipefitting, and power tool use, with trade safety being an integral part of all facets of instruction. Students learn to install and repair equipment in the shop and in actual field settings. The combination of shop practice and theory prepares students for employment and advancement in today's Heating, Ventilation and Air Conditioning (HVAC) industry. Students entering this program should have a basic mechanical aptitude, be able to move heavy objects, be self-motivated and a self-starter.

Metal Technology

The Metal Technology Program is designed to prepare individuals to apply technical knowledge and skills in a variety of metalworking occupations. Instruction includes setting up and operating machine tools; metal fabricating, forming and cutting machines; assembling of metal products and structures; practices related to ferrous and nonferrous foundries; and welding and cutting processes. Instruction is also provided in the use of hand and portable power tools in making computations related to work dimensions, the physical properties of materials and other related instruction and skills associated with metalworking occupations. Metals are formed, shaped, molded, heat treated, cut, twisted, fused, stamped or otherwise worked upon.

Contact

Joseph Greb

Western Montgomery Career and Technical Center
7 Graterford Road
Limerick, PA 19468
610-489-7272
www.westerncenter.org

NORTH MONTCO CAREER AND TECHNICAL CENTER

Mission Statement

The North Montco Technical Career Center is dedicated to delivering technical and academic programs that meet the needs of our students and prospective employers. This will be accomplished through a perpetual improvement system that ensures stakeholders an educated, competent individual capable of contributing to the welfare of the community.

Profile

North Montco Technical Career Center offers 22 programs within eight cluster areas including: Construction Trades, Cosmetology, Culinary Arts, Engineering/Manufacturing, Floral Design/Landscaping, Health and Human Services, Power and Transportation, and Visual Arts. In addition, all North Montco Technical Career Center's technical programs are linked to opportunities for students in post-secondary education. Students are also able to earn state and national certifications relevant to their programs. All of this culminates into a more trained workforce. Key components to training in all our programs have focused on changes in technology within the program. Partnerships with business and industry, manufacturing and schools, have kept our programs state-of-the art to meet the demands of local employers.

GPIC-Related Course Offerings

Construction Carpentry

The Construction Carpentry program covers instruction in safe and proper use of hand and power tools, drywall work, counter tops, finish carpentry, as well as building wood frame structures such as rough framing, roofing and siding.

HVAC

The heating, ventilation, air conditioning (HVAC) industry has become an increasingly important part of our environment. Indoor environmental air quality is essential in residential, commercial and industrial applications. Many technological advances could not be accomplished without the HVAC specialist. The HVAC program consists of basic to advanced instruction in both the installation and servicing of residential systems. Students are trained in electrical principles, plumbing, oil and gas heating, air conditioning, heat pumps and basic refrigeration systems.

Electrical Trades

Experienced electricians are in serious demand. Students in the Industrial Electric program learn about residential and commercial/industrial wiring and low-voltage systems, involving communication voice data and security systems. The program consists of instruction in electrical AC-DC theory, National Electric Code, wiring methods and industrial applications.



Drafting and Design

Students in the Drafting and Design program work with industry-standard software, computers and equipment to prepare for careers in drafting. Throughout the training at NMTCC, students will gradually master techniques in Drafting and Design. The course will start with Basic Drafting that includes Orthographic Projection, Auxiliary Views, Section Views, Dimensioning, Fasteners, Axonometric, and other basic drafting skills and will continue with learning how to use many of the latest software packages. These include the latest versions of AutoCAD, Architectural Desktop, Inventor, 3D Studio, and other related software packages.

Welding & Fabrication

The program is designed to establish a broad competency detailing the minimum acceptable skill, condition, task listing and profile that encompass the job classification of an entry-level welder. The curriculum includes shielded metal arc welding, gas metal arc welding, flux cored arc welding, gas tungsten arc welding, air carbon arc cutting and gouging, plasma cutting, oxy/fuel gas cutting, welding symbol drawing and interpretation, blue print reading, electric fundamentals, and weld inspection and testing.

Contact

William Krzemien

North Montco Career and Technical Center
1265 Sumneytown Pike
Lansdale, PA 19446
215-368-1177
www.nmtcc.org

MERCER COUNTY TECHNICAL SCHOOL

Mission Statement

In partnership with the educational, business, health care, industrial, cultural and labor communities, the Mercer County Technical School District enables youth and adults to acquire the knowledge, skills and attitudes necessary for career success in the ever-changing technological world. To accomplish this mission, the district will:

- Recognize that every student can learn
- Emphasize that learning is a lifelong process
- Provide relevant programs and instruction that respond to the unique and changing needs of students
- Foster an environment conducive to the teaching-learning process which promotes individual self-worth

Profile

Several “career-prep” programs are offered in conjunction with Mercer County Community College. These programs offer qualified high school seniors the opportunity to take challenging college-level course work while still in high school, gain college credits, and meet all high school graduation requirements. Career Prep includes the Performing Arts “career prep” program providing opportunity for secondary students to prepare for a career in the art of drama, dance, and vocal music on the West Windsor campus of the Mercer County Community College. Adult/post-secondary programs are designed for high school graduates and for those students who are considered “early leavers.” Students may attend school on a full-time basis. The Health Careers Center offers an array of post-secondary health-related career programs such as practical nursing, medical assisting, health technology, and other specialized courses.

The district also sponsors an alternative high school program designed to offer a learning environment different from the traditional form of education and to assist students in realizing their life goals and choices, talents, abilities, and career interests. The alternative education program is delivered at the Alfred Reed School in Ewing Township.

The Adult Evening Program of the Mercer County Technical Schools provides courses which are designed to upgrade the present skill level of the student; acquaint the student with recent changes and latest techniques which have become used within the respective occupational area; and provide entry level training for new employment or career change. The Adult Evening Program is always prepared and willing to assist local industry in the retraining and upgrading of their employees by providing special courses and customized training that will meet individual company needs. The Board of Education of the Mercer County Technical Schools will take into consideration the development of any additional fields of training which can be beneficial to the residents of Mercer County. Suggestions from agencies, management, and industry and labor organization are always welcomed.

Five general types of programs are taught within the Mercer County Technical Adult Evening School. These may be classified as being either Trade and Industrial, Apprenticeship Training, Technical, Computer Related, or Personal Enrichment/Vocational.

GPIC-Related Course Offerings

Blueprint Reading

(Building and Machine Trades or Construction Trades) A one-year program, consisting of Blueprint I and II, designed to enable the student to interpret and extract information contained on a simple blueprint or engineering drawing. This course meets one evening per week and focuses on either construction or machine related content.

Machine BPR Tolerancing

A twelve-night, one evening per week, theory course on advanced fit and tolerance considerations for machinists and tool and die technicians.

Carpentry

A four-year program, meeting two evenings per week, designed to provide related theory and “hands-on” instruction pertinent to residential construction. Apprenticeship training is also available.

Carpentry for the Home Owner

A ten-night “hands-on” course designed to provide the homeowner with solutions to common home repair problems. This program meets one evening per week.

Electrician

A four-year program designed to provide students with related theory and minimal “hands-on” instruction in various aspects of residential, commercial and industrial electrical systems. Apprenticeship training is also available. This program meets two evenings per week.

Electricity for the Homeowner

A ten-night “hands-on” course designed to provide the homeowner with basic knowledge and skills regarding minor electrical repairs and electrical fixture installation. This program meets one evening per week.

HVAC

A four-year program designed to provide students with related theory and “hands-on” instruction in various aspects of HVAC. Apprenticeship training is also available. This program meets two evenings per week.

Industrial Maintenance Mechanic

A four-year program designed to provide manufacturers and maintenance personnel with electromechanical knowledge and skills required for in-plant industrial applications. Apprenticeship training is also available. This program meets two evenings per week.

Machine Shop Practice

A two-year program designed to provide “hands-on” skills in the set-up and operation of standard machining equipment. Apprenticeship training is also available. This program meets two evenings per week.

Machine Tool and Die

A four-year program designed to provide entry-level skill development in tool and die processes. Apprenticeship training is also available. This program meets two evenings per week.

Math II – Construction Trades

A twelve-night, one evening per week, course designed to provide advanced mathematical skills for those students engaged in construction trades. This course should be taken with Blueprint II (construction trades).

Pipe Fitter/Steamfitter In-plant

A four-year program designed to provide students with industrial in-plant knowledge and skill development. Apprenticeship training is also available. This program meets two evenings per week.

Plumbing

A four-year program designed to prepare students for entry-level positions in plumbing. This program meets related training specifics and is scheduled for two evenings per week for a total of 156 hours per year. Apprenticeship training is also available.

Sheet Metal

A four-year program designed to prepare students for entry-level employment as a sheet metal fabricator. Apprenticeship training is also available. The program meets two evenings per week with theory and “hands-on” requirements.

Welding

A two-year program consisting of theory and “hands-on” exercises designed to prepare students in basic welding operations including Heliarc, MIG and TIG. Apprenticeship training is also available. Basic Math and Blueprint I may be added to supplement this training program, which meets two evenings per week.

Contact

Dr. Kimberly J. Schneider

Mercer County Technical School
1085 Old Trenton Road
Trenton, NJ 08690
609-586-5144
www.mcts.edu

SALEM COUNTY VOCATIONAL TECHNICAL HIGH SCHOOL

Mission Statement

The mission of the Salem County Vocational Technical School District is to prepare students for employment, for further education leading to employment, and for life-long learning.

Profile

The Salem County Vocational Technical Schools (SCVTS) serve over 8,500 county residents annually through a variety of educational programs and services. SCVTS offers a wide range of academy, career and technical education, career orientation and special education programs. These programs are offered on both a full-time and shared-time basis in cooperation and partnership with the county's elementary and secondary schools, local and regional colleges and universities, and with an array of business partners.

The Board of Education provides career and technical education opportunities for students at the Salem County Career and Technical High School in a campus setting. Students may choose from fourteen careers and technical education and the career orientation program opportunities that are offered at this site.

The district operates the Salem County Arts, Science and Technology Academies in partnership with four county high schools. The academy programs consist of full-time specialized theme programs that are operated in cooperation with Penns Grove High School, Pennsville Memorial High School, Schalick High School and Woodstown High School.

GPIC-Related Course Offerings

Construction Technology

The Construction Technology program is designed to provide basic knowledge of the construction industry and develop technical skills within the trade. Classroom instruction prepares students for an apprenticeship in one of the many areas within the construction realm, ranging from carpentry and masonry to plumbing and green technologies. The program relies on hands-on activities supported by visual presentations to assist the student with workplace preparation. Throughout the course of this program, students will study building codes; use math to understand and work with blueprints; and learn techniques to manage people and responsibilities at the work site. The information and techniques presented by this program illustrate practices that are generally accepted throughout the United States. Typically, these practices are taught to all entry-level apprentices.

Welding Technology

Students who enter the Welding Technology program can acquire an abundance of useful skills that will aid them in multiple trade areas. Many people who never intend to make welding a profession take welding courses to gain a valuable skill used in their own area of work. Plumbers often use a welding torch. Auto workers frequently utilize welding skills for auto body work. Even farmers benefit from welding skills by repairing their own tools and equipment, thus saving money. Welding Technology students develop



skills in a variety of areas such as: shielded metal arc, tungsten inert gas (TIG), metal inert gas (MIG), and oxy-fuel welding techniques. Through the use of blueprints and development of layout procedures, students also learn to make multi-positional, high quality welds on a variety of metals.

Electrical Technology

The primary goal of the Electrical Technology program is to educate students about the electrical trades through a comprehensive selection of courses ranging from theory to safety. At this level, students learn basic electrical theory, wiring methods and materials, national and local electrical codes, and print layout. Students acquire the experience to install receptacles, switches, lighting, and service entrance conductors. While working with the various circuits for residential, commercial, and industrial facilities, students learn to work safely around electricity and to use the proper tools for the respective wiring job. As students progress through the program, they will learn about motors, programmable logic controls, generators, and meters. By program's end, students should be able to exhibit practical and mathematical knowledge to support, explain, and troubleshoot each application learned.

Academy for Energy Applications

The Academy is offered through the Salem County Career and Technical High School in partnership with PSEG Nuclear. The academy explores both the existing systems of delivery, as well as, the development of renewable sources in emerging fields of energy. Students learn the engineering of power generation and apply the principles of chemistry and physics.

This academy includes the study of the history, structure, and future of electric power production with both traditional and alternate energy sources. Students learn the basic principles of AC/DC electrical theory, compare methods of power generation, and explore the functions of plant operations from machinery to system design. Through hands-on application, students will engage in science experiments, modeling, and schematic mock-ups including solar panels and wind turbines. Cross-curricular projects will be developed with real-world components.

The academy provides several options for students dependent upon each student's career and/or college goals. Students pursuing the advanced level options in preparation for a four year baccalaureate program will have the opportunity to enroll in honors-level science and math courses. Students who participate in this academy also have the opportunity to pursue complimentary, elective technical courses available through the Career and Technical High School.

Contact

Jason Helder

Salem County Vocational Technical High School
880 Rt. 45
Woodstown, NJ, 08098
856-769-0101
www.scvts.org



Community Colleges

BUCKS COUNTY COMMUNITY COLLEGE

Mission Statement

The Mission of Bucks County Community College is to provide to the county's diverse population of learners comprehensive educational, training, and cultural opportunities that are accessible, affordable and convenient, and that will equip them to be successful and effective in their work and as citizens of the world.

Profile

Bucks County Community College was founded in 1964 in response to a need for a public two-year collegiate institution to serve graduates of the county's high schools and other citizens of Bucks County who would benefit from an experience in higher education. Most graduates of the College's transfer programs have attended Pennsylvania's four-year colleges or other State-related institutions. Other graduates of the College have gone on to pursue their studies at more than 300 other four-year institutions in forty-five states as well as the District of Columbia, Puerto Rico, Germany, France, Great Britain, and Sweden.

Bucks County Community College offers a wide range of academic programs, services and facilities right in the neighborhood. Classes are held at the beautiful 200-acre campus along the Neshaminy Creek in Newtown, our Upper Bucks Campus along the East Branch of the Perkiomen Creek in Perkasié, and its Lower Bucks Campus adjacent to the Delhaas woods in Bristol Township.

GPIC-Related Course Offerings

Green Jobs Academy

The Green Jobs Academy at Bucks County Community College is an exciting collaborative venture that includes public and private industry partners. The Green Jobs Academy provides both long and short term training programs geared toward workers looking for new skill sets in the green and sustainability industries.

Registered Electrician Apprenticeship

The registered electrical apprenticeship program is a four-year classroom and on-the-job training program for those individuals who want to become an electrician. The program provides the apprentice with both the theory and practical training needed to attain the status of electrician. Students must annually attend 165 hours of classroom instruction and have 2,000 hours of documented on-the-job training. Over the program's 4 years this will equal 576 hrs. of class room training and 8,000 hrs. of on-the job training.

The first year introduces apprentices to basic electrical principles and direct current (DC) electricity. These fundamentals form the foundation to understand National Electrical Code requirements which is at the heart of the program. By the end of the first year, students will begin using the National Electrical Code and learn proper installation methods for residential wiring.

Commercial Building & Construction: Green Advantage

This workshop presented by highly experienced and certified trainers representing the construction/contracting perspective and/or the architectural/design perspective. This training course prepares individuals for the Green Advantage® Commercial Exam. Practitioners, who pass the exam, become Green Advantage® Certified for a period of three years.

This curriculum is registered with the American Institute of Architects (AIA) CES provider program. Completion qualifies you for eight continuing education units, four in Health & Safety, and four in Sustainability

LEED Green Associate

This course will provide an overview of the LEED® Green Associate credentialing process; the first step in obtaining a LEED AP (Accredited Professional) specialization. The course is designed to develop your knowledge base and skills for understanding green design, construction and operations, connect sustainability and LEED, understand the technical and relevant issues of the LEED credit system, and understand the LEED process.

Sustainable Building Advisor

The Sustainable Building Advisor Certificate Program is a nine-month, specialized training program, designed to enable graduates to advise employers or clients on strategies and tools for implementing sustainable building.

NABCEP PV Installer Certification Exam Prep Course

This intensive two-day, 16-Hour course is designed to prepare individuals to take the NABCEP PV Installer Certification Test. Information will be presented in a fast paced and concise manner. Class size will be limited to 20 students to ensure that each student receives quality training. The course will cover the NABCEP provided learning objectives to help prepare students for the PV Installer Certification Exam.

Topics include: In-depth review of NEC Article 690; Calculating requirements for roof top conduit runs; Determining the proper distance between PV arrays based on sun angles and module dimensions; Final system commissioning and troubleshooting; PV Racking methods and considerations; String sizing; and Battery based system components and sizing.

PA-DOE Lead Safe Weatherization Training

On April 22, 2010 EPA-HUD's Lead Regulations went into effect requiring workers doing renovations, repairs and painting (RRP) on homes, buildings and child-occupied facilities built prior to 1978 to have lead training. In addition to applying to renovations, repairs and painting, the law also applies to weatherization work. Pennsylvania specifically requires that all weatherization workers have Lead Safe Weatherization training. This course meets Pennsylvania's and the Department of Energy's learning requirements for doing Lead Safe Weatherization requirements.

Contact

Christine Gillespie

Bucks County Community College
275 Swamp Road
Newtown, PA 18940
215-968-8000
www.bucks.edu

Mission Statement

Burlington County College, a comprehensive community college, provides all individuals access to affordable and quality education.

Profile

Now in its fourth decade, Burlington County College serves the people and business community of New Jersey's largest geographic county by offering programs from many accessible locations. There are two campuses in Pemberton and Mt. Laurel and two centers in Mt. Holly and Willingboro which offer a full range of student services, as well as personal, cultural and recreational enrichment programs.

The rapidly growing Mt. Laurel Campus, in the heart of South Jersey's high tech corridor, will account for about 50 percent of the College's student body. The Campus opened three new buildings in 2002: the Central Power Plant, the Academic Building and the spectacular new Enterprise Center, a professionally managed conference and training center-the first of its kind in the region. The Burlington ACT Center on the Pemberton Campus offers individuals and corporate clients a broad array of job training courses, and an approved testing center for an inventory of professional licenses and certifications.

GPIC-Related Course Offerings

Construction Management

Construction management is a dynamic profession – a combination of technology, art and science. While an understanding of the technical aspects of construction is extremely important, it is also essential that construction professionals have a comprehensive knowledge of the business and management aspects of the profession.

And though construction has traditionally been a very conservative industry, the increasing rate of technological development and competition in the industry have served to accelerate the development of new construction methods, equipment, materials, and management techniques. As a result of these forces, there is an increasing need for innovative and professionally competent construction professionals. Students enrolled in the Construction Management program receive broad academic, technical, business, and construction management courses that are designed to produce well rounded construction professionals.

Principles of Green Building & LEED Core Concepts Certificate

This 36-hour LEED Green Associate training conveys the core concepts of LEED and prepares you for the LEED Green Associate exam. The LEED Green Associate credential is intended for individuals who want to demonstrate expertise in non-technical fields of green design, construction and operations and is the first step for professionals pursuing a LEED AP specialization.

Indoor Environmental Quality-New Home Construction

The purpose of this seminar is to provide an overview of the most important indoor pollutants, including their sources, health effects, detection and mitigation, with particular reference to residential construction. Discussion will also include design approaches, materials selection and an outline of a residential ventilation standard (ASHRAE 62.2) that can be used in new construction.

This course provides an understanding of the important indoor pollutants that are addressed by green homes rating systems, providing professional development in an area that is experiencing rapid growth. A brief review of these ratings systems will be provided, along with a list of resources. This course would benefit architects, builders, construction officials and those pursuing careers in green construction.

BPI Certification-Building Analyst I

This training is to become a home performance pro with Building Performance Institute's (BPI) Building Analyst I certification. Training will give the knowledge and skills to perform whole house energy audits. Understand the relationship between all the systems of the house and the effects on health, safety, comfort and efficiency. Gain knowledge of building science fundamentals, energy conservation strategies, heat loss calculations, and blower door testing. In this two-week training program, become skilled at how to find the cause of customers' energy conservation problems and provide solutions that work.

Principles of Green Buildings

This program teaches individuals in the building, remodeling, or trade industry the principles of making buildings perform more efficiently.

Performing Comprehensive Building Assessments

This intermediate program is geared toward conducting visual building inspections, performing diagnostic testing, and determining residential building improvement opportunities in the field; then documenting a home's performance, and prioritizing improvements for homeowners.

Senior Certified Sustainability Professional

This program is designed to prepare students to become leaders in the green collar economy. The certification exam is included at no additional cost.

Certified Indoor Air Quality Manager (CIAQM)

This program is perfect for facility managers, building engineers, and health and safety officers who want to improve the indoor air quality (IAQ) of buildings.

Certified Green Supply Chain Professional

Students will learn to create sustainability programs and apply "lean and green" manufacturing strategies. This program also includes the certification exam at no additional cost.

Certified Indoor Environmentalist (CIE)

This program teaches all of the practical steps needed in order to make indoor environmental assessments, including how to take samples and how to resolve common (IAQ) problems.

Contact

Richard Messina

Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068-1599
609-894-9311 or 856-222-9311
www.bcc.edu

CAMDEN COUNTY COLLEGE (NJ)

Mission Statement

Camden County College will continue to enhance the quality of life in Camden County and beyond by preparing students to live, work and thrive in a global economy. The College also will further fulfill its responsibility to the citizens of Camden County and New Jersey by continuing to create a skilled and stable local workforce; encourage enlightened civic engagement; provide an avenue of social mobility; and serve as a destination for cultural and recreational activities.

Profile

Camden County College is one of the largest, most comprehensive community colleges in New Jersey and the surrounding region and is a vital resource for transfer education, workforce training and cultural events. Its three distinct campuses in Blackwood, Camden and Cherry Hill – along with its satellite locations in Lakeland, Sicklerville and elsewhere throughout the county – share the common mission of providing accessible, affordable higher education and occupational study to all who can benefit.

The College also offers courses at various community locations throughout Camden County to bring additional educational opportunities right where residents live and work. Furthermore, in 2011, CCC assumed administration of the Camden County Regional Emergency Training Center, the Technical Institute of Camden County and the Camden County Police Academy. This development has brought all county-funded post-secondary education under the supervision of the College.

Thanks to technology-rich physical resources and highly qualified, dedicated faculty, staff and administration, Camden County College maintains a tradition of high-quality education and a reputation of agile, responsive service. Each year, the College serves more than 30,000 students through 100-plus degree and certificate programs and hundreds of non-credit and community-interest courses.

GPIC-Related Course Offerings

Construction Technology Programs

Students gain the carpentry skills necessary to find employment in the fast growing residential, commercial, industrial, and institutional industries. The curriculum provides training in the fundamentals of construction techniques, including: print reading and drawing, materials management, surveying, computer cost estimating, frame construction, roofing, siding, drywall, and finish carpentry.

Woodworking

This course is designed to teach students the use of hand tools, portable power tools and machinery. Students will learn joinery, measurement, layout, design, estimating and related skills required to build furniture; such as: bookcases, tables, cabinets and more. Students will be taught how to install moldings such as crown, chair rail, casing and base. Students will have access to our new spray booth with HVLP spray system, and will learn how to get a professional wood finish on their projects.

Electrical Technology

The program is intended to provide a basic theory and trade background for students who wish to enter the electrician trade, as well as to provide a sound electrical foundation for students who wish to continue their training or enter fields such as: electrical maintenance, electronics, HVAC, or electrical technician. During the fall semester students will learn related math, basic electrical principles, DC and AC theory, magnetism, induced voltage transformers and residential electrical installations.

Electrical—Residential

Students in this program will be taught extensive electrical theory. The core unit will be a hands-on approach emphasizing house wiring, branch circuits, wire sizing, cable layout, three and four-way switches and ground fault circuit interruption. Additional units include service entrance equipment and calculations which are coordinated with basic electrical theory. Further, the student will learn and apply electrical subject units such as: commercial-residential electrical and architectural drawings; branch circuits and feeders; appliance circuits; lamps and lighting; panel-board selection. In addition, students will learn math as it applies to the electrical trade. Addition, subtraction, multiplication, basic algebra and some trigonometry is required to perform the job of electrician.

Electrical, Commercial

The program is designed for persons with experience working with wiring methods in the residential industry who desire to advance their individual skills into the commercial area. This course will increase the individual's knowledge of electrical theory, the national electrical code and troubleshooting methods. Emphasis will be on commercial wiring applications and equipment.

Electrical, License Preparation

This program is designed for students with demonstrated industry experience seeking to prepare for the NJ Electrical Contractors License. Units of study include: Residential & Commercial Review, Industrial Electrical Principles, Electrical Motor Controls and Automated Industrial Systems, and Electrical Math. NJ Contracting Law will be covered extensively, as well.

HVAC

Students will prepare for the EPA approved section 608 certification exams. Section 608 technician certification is required by the EPA in order to purchase CFC or HCFC containing refrigerants. Students will thoroughly study required material related to the theory of operations; including: safety, leak detection, heating systems (gas, oil, electric), combustion testing, heat pumps, refrigerant recovery and disposal, and the national fuel code. Hands on-training will reinforce material covered in theory classes. Computer based training is also provided for self-paced study opportunities.

Construction

This course is designed to prepare inspectors to become subcode officials. The class will cover subcode administration, legal aspects of code enforcement, and related legislation. Specific topics will include procedures and forms for permit application, stop orders, emergency situations, condemnations, case records, warrants relocation, housing maintenance, and legal rights of landlords and tenants.

Electrical Inspector HHS

This course is designed to provide students with knowledge of advanced electrical systems design. Students must complete the ICS course before undertaking this course.

Welder and Fitter Training, Basic

Field and Maintenance Applications This 40-hour entry level class has been designed for students to obtain the fundamental principles of common welding practices in today's industry. Welding styles that will be taught and practiced are: Oxyacetylene, Gas metal Arc Welding GMAW (commonly known as MIG), Gas Tungsten Arc Welding GTAW (commonly known as TIG), Shielded Metal Arc Welding (commonly known as ARC). Oxyacetylene burning and plasma cutting will be taught and practiced. Metallurgy, safety, welding symbol print reading will all be components of the class.

Construction Management Certificate

This certificate program is designed for contractors, sub-contractors, construction workers, building and facility managers, architects, and others in the field of contracting who would like to develop their abilities and skills for effective management of construction projects. The Construction Management Certificate program consists of five required courses, which will prepare you for the field of construction project management.



Green Certified Home Inspector

This course includes an overview of renewable energy and energy efficiency and suggestions on what the home inspector can do to assist homeowners and homebuyers in making informed decisions on future renovations. Upon passing the final exam, inspectors will receive the GCHI-GL, a Level One Green Certified Home Inspector, with the Green Leadership Certification.

Green Certified Mortgage Professional

This course will provide an overview of green building systems and energy financing products to help a homeowner to become more energy efficient. Upon passing the final exam, licensed professionals will receive the GCMP-GL, a Level One Green Certified Mortgage Professional, with the Green Leadership Certification.

Certified Green Consultant

This is a true consulting course of training enabling the consultant to provide Green consulting, assessment, and certification assistance to businesses. This is a holistic program including energy, water, waste, indoor air quality, and other critical assessment issue required for Green certification. You will earn your Certified Green Consultant™ upon successful completion.

Contact

Sivaraman Anbarasan

Camden County College
Executive Dean of Continuing Education
200 N. Broadway
Camden, NJ 08012
856-227-7200 or 856-874-6004
www.camdencc.edu

Mission Statement

The mission of Delaware County Community College is to facilitate learning by providing quality educational programs and services that are student-focused, accessible, comprehensive and flexible to meet the educational needs of the diverse communities it serves. In doing so, the College will enable its students to develop themselves to the limit of their desires and capabilities and to be successful.

Profile

Delaware County Community College was founded in 1967 and has grown to serve more than 28,000 students each year in Delaware and Chester Counties. With five major locations that offer a total of 33 associate degree, 17 transfer degree and 33 certificate programs, it has been the convenient college choice for our community for decades. Technical facilities at the Malin Road Center in Broomall are closed with the opening of the Advanced Technology Center.

The first portion of the STEM (<https://www.dccc.edu/node/1153>) Complex opened as programs formerly offered at the Malin Road Center moved to the new Advanced Technology Center at the Marple Campus. The only program that remained at Malin Road was the Municipal Police Academy. Like many other community colleges, Delaware County is experiencing a sharp spike in enrollments at all six major locations in Delaware and Chester counties.

GPIC-Related Course Offerings

Construction Management Technology

The program in Construction Management is intended to prepare graduates for employment in the construction industry as entry-level assistants to project managers, engineers, field superintendents, estimators, expeditors and inspectors. Emphasis is placed on the development of knowledge and skills in modern information systems as they relate to strategic planning and process management, while completing a basic survey of the theory and technology of the construction industry. The program has been designed to meet the needs of a variety of students. These students range from skilled trade workers who seek supervisory or management positions to recent high school graduates beginning a career in the field of Construction Management.

Mechanical and Electrical Systems in Buildings

This course presents a quantitative and qualitative survey of lighting, power distribution and heating, ventilating and cooling systems in buildings. Emphasis is placed on considering the impact of design decisions on life cycle costs and operations issues.

Understanding the Economics of Today's Energy Business

Instruction in the course provides a comprehensive overview of the North American energy industry and the current technological, economic, and political environment in which the industry currently find itself. Availability

for consumers; the basic of system operations, including generation, transmission, and distribution; the characteristics and pros and cons of the different methods of electrical generation; the classes of the electricity consumers and the needs and characteristics of each consumer class will be addressed in this course. The history of the electric industry, including the history of regulation, deregulation, and market restructuring; the wholesale and retail electric marketplace, marketplace participants, and the various market structures will be studied.

Energy Technology

The Energy Technology Associate in Applied Science degree program prepares, in a generic fashion, individuals for entry-level employment as a generation technician, a maintenance technician, a non-licensed operator, or related contracting field employee capable of working in varied types of electrical energy producing power plants.

Electrical Energy Production

This course is designed to introduce the electrical power production technician to the integral phases, processes, and equipment associated with the generation of electricity. The study of processes leading to the ultimate production of electricity (via generation) will include: fuel handling, boilers, prime movers, and most importantly generators (environmental concerns will be addressed for each phase of production). The inter-relationships among the three areas of electricity production; generation, transmission, and distribution will also be covered. Aspects of distributed generation (the installation of small units to meet industry needs) will be included as well. Green power units such as fuel cells, solar power, and renewable energy for the production of electricity will also be discussed.

Facility Management Technology

Most large corporate enterprises have individuals within their organizational structure charged with the duties of planning and operating the physical facility that houses the organization and its operations. For many companies, these facilities are the largest part of the corporate assets, and their management has become a critical corporate function. There is a growing recognition of the need for sophisticated skills and knowledge in performing this function. Today, the field of facility management is an emerging profession with strong potential for future growth and development.

Engineering Technology

AET is a highly technical, hands-on minds-on, challenging educational program aimed at supporting business and industry throughout the region. Delaware County Community College graduates learn and apply Engineering principles in a highly technical environment and work to bring new ideas to reality. Focusing on high-growth, high-priority occupations, graduates earn lucrative salaries, and can benefit from educational pathways that allow students to earn an entry level certificate, associate degree, or transfer to a four-year degree program.



HVAC

The associate degree in Heating, Ventilation, Air Conditioning and Refrigeration prepares students for employment as HVAC&R technicians who work on a variety of equipment and products. This work may include installation, maintenance and repair of various types of climate control units. The Delaware Valley chapter of The Air Conditioning Contractors of America (ACCA) has joined with the College to develop this program. The goal is to provide an educational program for current technicians, and for the basic preparation of individuals seeking entry to this field.

Industrial Systems

The associate degree in Industrial Systems Technology prepares students for employment as Industrial Systems and Maintenance Technicians with responsibility for installing, maintaining, troubleshooting, repairing and/or replacing a variety of equipment in a manufacturing environment. Specific topics of coverage will include fluid power and controls, gear and belt-drive systems, conveyors, electric motors and control systems, programmable logic controls and process control. Industrial Systems Technicians work directly with engineers, designers and plant management as well as specialized equipment installers.

Contact

Dr. John R. Agar, Jr., Dean or Larry Arrington, Jr., M.Ed., Assistant Dean

Dean's Office, Marple Campus, Delaware County Community College

901 South Media Line Road

STEM Building, Room 2400

Media, PA 19063

610-359-5082 or 610-359-5000

www.dccc.edu

Mission Statement

As a community college faculty, we believe that our students deserve a high-quality education that challenges them to acquire new knowledge and skills, test their accustomed ideas, and achieve competitive excellence. All of our students, regardless of where they find themselves when they come to us, deserve a caring, creative, and engaged pedagogy that helps them achieve their goals, and which cultivates lifelong learning and a passion to understand themselves and the world. We believe that we must create a college community that engages students in civic life and prepares them to fully participate in our democracy. We are responsible and accountable for giving our students' work our respect and critical evaluation, for holding students to the highest ethical standards, and for providing effective feedback that encourages our students to grow.

Profile

Established in 1966, Mercer County Community College (MCCC) is a publicly-supported comprehensive educational institution that provides opportunities for higher education through an open-door admission policy. Students may study full-time or part-time. However, some courses are offered during day hours only. Admission to the program requires a high school diploma or its equivalent with one year of algebra. MCCC is located in close proximity to many governmental offices and architectural and consulting engineering firms. Cooperative education opportunities are available. Students wishing to transfer and pursue a bachelor's degree are encouraged to take advanced mathematics (including calculus), college physics, Fluid Mechanics, and Surveying II. Graduates who do so can receive full junior status toward a B.S. degree in the Construction Engineering Technology program at New Jersey Institute of Technology ((NJIT) and other four-year institutions.

GPIC-Related Course Offerings

Building Construction Technology

The Building Construction Technology degree program prepares graduates for careers in the building construction industry in field and office positions with architects, engineers, or construction firms.

Successful graduates of the program will be able to:

- Understand drafting and design standards used in the building construction industry to interpret construction documents and drawings;
- Interpret construction documents for conformity with construction codes and regulations;
- Prepare cost estimates, performing quantity take-offs and developing detailed project proposals and documentation;
- Identify, execute, and enforce construction safety standards on the job site

- Demonstrate knowledge of the science of materials and methods of construction as they apply to the Construction Specifications Institute (CSI) Divisions;
- Identify established surveying procedures for the layout of a project in accordance with construction document drawings and site information;
- Demonstrate knowledge of overall field administration
- Prepare construction project schedules and maintain field records.

Engineering Graphics

Broad-based course in basic graphic concepts of engineering drawing, including such topics as orthographic projection, sectioning, isometric drawing, and dimensioning. The well-trained engineer, scientist, or technician must be able to make correct graphical representations of engineering structures, designs, and data relationships. Throughout the course, the correct methods of graphic representation and instrument use will be demonstrated and explained. The student is expected to learn these methods and techniques so that correct habits may be formed and maintained. The instructor will insist upon absolutely correct form and solutions at all times.

Solar Energy Technology

Global energy initiatives reflect a shift towards clean and efficient methods of producing energy. The Solar/Energy Technology certificate offers students a foundation in construction basics, a comprehensive introduction to the wide range of energy sources, and training in areas of installation and auditing. Successful graduates of the program will be able to:

- Understand available renewable energy systems;
- Demonstrate knowledge of basic circuitry and electronic components;
- Use hand tools and apply metalworking skills to fabricate electronic chassis;
- Comprehend building construction systems;
- Apply energy auditing and weatherization processes to existing structures
- Demonstrate specific skills related to solar installation applications.

HVAC

Heating, Refrigeration and Air Conditioning is a joint program between Mercer County Community College and the Mercer County Technical Schools. It is designed to prepare students for employment in commercial establishments and industry, in such positions as refrigeration mechanic, commercial air conditioning mechanic, furnace installer and repairer, oil burner installation and service technician, gas heating system servicer, and mobile air conditioning system mechanic. Admission to the certificate program requires a high school diploma or its equivalent with one year of algebra or applied mathematics. Students must demonstrate mathematics proficiency at the MAT 037 level to qualify for the certificate. The program is part-time only and most courses are offered only during the evening.

Contact

*Melinna Harris,
Director Career Training Institute*

Mercer County Community College
102 N. Broad Street
Trenton, NJ 08608
609-586-4800, ext 3138
www.mccc.edu

MONTGOMERY COUNTY COMMUNITY COLLEGE

Mission Statement

The College believes that learning is a lifelong activity requiring constant adaptation of programs, courses, and learning support services to reflect social, technological, and workforce changes and to ensure that all learners reach their unique goals. Believing in the right of everyone to have access to a quality education, to workforce training, to opportunities for personal and professional growth, and to culture and recreation, the College translates the values of its community and reaches out to it, inviting involvement, offering learning, and fostering understanding.

Profile

Founded in 1964, enrollment includes 18,133 credit students and 12,677 non-credit students for 2007-2008. 87.5% are county residents, 45.9% of students are full-time, and 21% of students are minorities. The average age is 27. The school is a member of the American College and University President's Climate Commitment (ACUPCC), joining more than 600 other institutions across the country that have set climate neutrality as a goal. MCCC has been selected as one of 82 colleges across the country to participate in the Lumina and Heinz Foundation's "Achieving the Dream" effort, allowing the College to work with national experts and other community colleges in collectively identifying strategies to increase student success. The school offers customized training and workforce development grants to 150 area businesses through the College's Center for Workforce Development.

GPIC-Related Course Offerings

Green Buildings

The purpose of this program is to provide an overview of the construction industry with the integration of green technologies. In the Green Building program, participants will receive an overview of the construction industry with the integration of green approaches, practices and products. It provides fundamental instruction in the green environment, green construction practices, and green building rating systems.

Introduction to Solar Installation

This program is for construction workers to learn how to install the systems that generate solar electricity to heat and cool homes and buildings. It adheres to industry standards as prescribed by The North American Board of Certified Energy Practitioners (NABCEP).

The Introduction to Solar Installation program provides classroom and hands-on training. It is a beginner program in the study of solar photovoltaic (PV) cells, modules, and system components; electrical circuits; PV system design and sizing for use on homes; solar electric products and applications; and understanding energy conversion from sunlight to electricity, and working with solar conversion equipment. The program will introduce functions and fundamentals of the photovoltaic industry which includes maintenance, installation and planning. Areas covered will be electricity and the distribution and transmission of electric power. This program enables participants to be prepared to become certified by NABCEP (North American Board of Certified Energy Practitioners). This is a 45-hour program offered over 11 weeks.

Individuals successfully completing the Introduction to Solar Installation program are eligible to take the North American Board of Certified Energy Practitioners (NABCEP) Photovoltaic (PV) Entry Level Certificate of Knowledge Exam.

Sustainable Building Advisor

The program provides the skill and knowledge to apply sustainable concepts to designing or constructing a building. It is approved by the National Sustainable Building Advisor Program (NaSBAP).

The Sustainable Building Advisor (SBA) program is a 9-month certificate training program and exam specifically designed for working professionals eager to apply sustainable concepts to the building design, development and construction. Through expert instructors and guest speakers, team projects, site visits to exemplary projects, and access to the latest in green building resources, the SBA program provides the information needed to create buildings that are energy and resource efficient, healthy working and living environments, environmentally responsible and cost effective. The Sustainable Building Advisor (SBA) program welcomes a diverse range of

students drawn from architecture and planning firms, engineering companies, developers and contractors, government agencies, research institutions, resource conservation organizations, utilities and environmental consulting organizations. This is a 108-hour program offered over 9 months.

By the end of the program, participants should be able to

- Identify and discuss the key practices of sustainable building
- Apply LEED, Built Green and other relevant criteria or established guidelines
- Analyze the costs and benefits of incorporating sustainable building measures
- Work with architects, designers, builders, building operators, and utilities to improve a building's performance
- Consideration for Industry Certification. Individuals successfully completing the Sustainable Building Advisor course are eligible to take an exam and earn the designation CSBA (Certified Sustainable Building Advisor)

LEED- new construction and renovations

This program is for construction workers to learn how to install the systems that generate solar electricity to heat and cool homes and buildings. It adheres to industry standards as prescribed by The North American Board of Certified Energy Practitioners (NABCEP).

The Introduction to Solar Installation program provides classroom and hands-on training. It is a beginner program in the study of solar photovoltaic (PV) cells, modules, and system components; electrical circuits; PV system design and sizing for use on homes; solar electric products and applications; and understanding energy conversion from sunlight to electricity, and working with solar conversion equipment. The program will introduce functions and fundamentals of the photovoltaic industry which includes maintenance, installation and planning. Areas covered will be electricity and the distribution and transmission of electric power. This program enables participants to be prepared to become certified by NABCEP (North American Board of Certified Energy Practitioners). This is a 45-hour program offered over 11 weeks.

Individuals successfully completing the Introduction to Solar Installation program are eligible to take the North American Board of Certified Energy Practitioners (NABCEP) Photovoltaic (PV) Entry Level Certificate of Knowledge Exam.



Engineering Technology

The Engineering Technology program is designed to prepare graduates for career positions as engineering technicians in the advanced technology areas of instrumentation, communications, and mechanical structures and systems. The technician fills the role of applications expert serving under engineers and technologists. A solid foundation in applied mathematics and physical science is necessary to enable the technician to communicate well in an engineering environment.

Objectives of the program:

- Demonstrate the skills necessary to obtain entry level engineering technician positions in industry
- Demonstrate the ability to model simple engineering situations and to perform general calculations to analyze the model
- Demonstrate a thorough understanding of the functions of electrical and mechanical components and systems
- Identify component and system level problems by employing state-of-the-art test equipment and techniques
- Demonstrate project engineering skills including good oral communication and technical writing proficiency

Contact

Joan Branch
Coordinator, Green Technology

Montgomery County Community College
340 DeKalb Pike
Blue Bell, PA 19422
215-619-7331 or 215-641-6300
www.mc3.edu

Mission Statement

Community College of Philadelphia is an open-admission, associate-degree-granting institution which provides access to higher education for all who may benefit. Its programs of study in the liberal arts and sciences, career technologies, and basic academic skills provide a coherent foundation for college transfer, employment, and life-long learning. The College serves Philadelphia by preparing its students to be informed and concerned citizens, active participants in the cultural life of the city, and enabled to meet the changing needs of business, industry and the professions. To help address broad economic, cultural and political concerns in the city and beyond, the College draws together students from a wide range of ages and backgrounds and seeks to provide the programs and support they need to achieve their goals.

Profile

Community College of Philadelphia is the largest public institution of higher education in the City. Since 1965, over 500,000 students have passed through our doors seeking associate's degrees, certificates, improved workplace skills and life-long learning. Many of our degree students transfer to four-year institutions while others seek employment in the Philadelphia region. Over 90 percent of our graduates remain in the area and seek employment, strengthening our local economy and workforce. Local businesses look to us to provide workplace training to keep their workers skilled and their companies competitive.

The college offers over 70 degree and certificate programs in art, science, business, technology and liberal arts. Many of the students have hectic schedules, and they know how to accommodate every type of learner. Classes are held during the day, in the evening and on Saturdays at the Main Campus, our three Regional Centers and at neighborhood sites throughout the City. Distance education classes are also available.

GPIC-Related Course Offerings

Building Science

This program prepares students for a variety of careers in the energy conservation industry and related fields, such as energy auditors, renewable energy installers and designers, energy conservation installers and computer energy modelers. Individuals interested in developing small independent energy conservation contracting businesses will also find this program useful toward achieving that goal. Although designed for career preparation, it also can serve students interested in continuing their studies leading to a bachelor's degree. Courses within this program utilize the latest industry-standard scientific methods, instruments and software for determining the energy consumption profile for buildings.

Energy Conservation

This program prepares students for a variety of careers in the energy conservation industry and related fields, such as energy auditors, product specifiers, quality control supervisors, materials testers, and site inspectors. Individuals interested in developing small independent energy conservation contracting businesses will also find this program useful toward achieving that goal. Courses within this program utilize the latest industry-standard scientific methods, instruments and software for determining the energy consumption profile for buildings. .

Facility Management – Construction Option

The Facility Management program leads to an Associate of Applied Science (A.A.S.) degree in Facility Management. Facility Managers are the people who plan and manage the buildings, grounds and systems of large businesses and institutions. Often working behind the scenes, as a group they are involved in a broad array of activities: planning, management, finance and real estate, design, and building operations issues, including security and communications. The field is rapidly professionalizing, and opportunities abound in this highly-regarded industry. This program provides students with a foundational education addressing the multi-disciplinary character of the field, thereby allowing for diverse job opportunities. The core of the Facility Management curriculum addresses gaining the basic technical knowledge of construction materials, processes and systems, as well as the business management and real estate areas.

The Facility Management – Construction Option is designed to prepare students for an entry-level position as a facility manager or construction manager. Their construction knowledge may be applied in overseeing the building of new or renovated facilities, the installation of updated systems, or determining the construction issues related to expansion or new uses. They will work closely with those in the design areas. In any of these roles, the students will be prepared to interact with the senior management of their employer, dealing with multiple real estate issues.

The Construction Option focuses on construction and management issues specific to the building and renovating process, such as the installation of updated systems and finishes, building codes, cost estimating, and scheduling and contracting. This program gives the student an opportunity to understand the fundamentals of building construction, such as interpreting construction documents and specifications, understanding construction contracts, creating construction cost estimates, scheduling and managing building projects, and being familiar with the technical aspects of building materials and systems.

Students who are interested in the program are encouraged to consult an advisor within the program for a more detailed explanation of the two options. Also, the program has a set of core courses which are common to both degrees. Students who are unsure as to which option they would like to pursue may wish to begin with those courses which are required by both options, so that they may change their option more easily at a later point. The Facility Management Program is accredited by the International Facility Management Association (IFMA) Foundation.

Facility Management – Design Option

The Facility Management curriculum leads to an Associate of Applied Science (A.A.S.) degree in Facility Management. Facility managers are the people who plan and manage the buildings, grounds and systems of large businesses and institutions. Often working behind the scenes, as a group they are involved in a broad array of activities: planning, management, finance and real estate, design and building operations issues, including security and communications. The field is rapidly professionalizing, and opportunities abound in this highly-regarded industry. This program provides students with a foundational education addressing the multidisciplinary character of the field, thereby allowing for diverse job opportunities. The core of the Facility Management curriculum addresses gaining the basic technical knowledge of construction materials, processes and systems, as well as the business management and real estate areas. The Design Option focuses particularly on developing planning and design skills for both new and renovated buildings.

The Design Option is intended to prepare a student for an entry-level position as a facility manager, space programmer, space planner or move coordinator. Their design skills will be utilized in designing renovations, planning expansions and supervising outside design consultants. They will work closely with those in the construction areas. In any of these roles, the students will be prepared to interact with the senior management of their employer, dealing with multiple real estate issues.

The Design Option listed here gives the student an opportunity to acquire design skills to apply toward new and renovated buildings, as well as evaluating and planning development sites. Experience with working in teams, as well as communicating design concepts is emphasized. The design studio, the core learning environment in design education, offers the opportunity to develop design skills and understand the conceptual framework of the design process.



Students who are interested in the program are encouraged to consult an advisor within the program for a more detailed explanation of the two options. Also, the program has a set of core courses which are common to both degrees. Students who are unsure as to which option they would like to pursue may wish to begin with those courses which are required by both options, so that they may change their option more easily at a later point.

The Facility Management Program is accredited by the International Facility Management Association (IFMA) Foundation.

Construction Materials and Detailing: Properties

This course introduces students to commonly employed construction materials, from those used in excavation and foundations through framing and roofing. Materials are studied in terms of their historical uses, composition, physical properties, manufacture and assembly, applications, regulatory constraints and sustainability. Basic terminology, principles and processes in design and construction, and factors that influence material selection and material assemblies are discussed. Construction details are examined and developed. Students learn about key issues including sustainable design, new technologies and materials and the importance of effective team collaboration.

Building Codes

Students are introduced to the nationwide model building codes produced by the International Codes Council. The focus will be on the International Building Code (IBC) as well as the state and local adaptations of it. Applicable reference standards and related codes involved in building construction are also addressed. Application of the codes to buildings and occupancies is emphasized, and the role and influence of codes in design and construction is examined. Topics include: 1) general concepts of occupancy, types of construction and height and area limitations; 2) fire safety and containment related to materials, assemblies and protection systems; and 3) a more in-depth look at aspects related to egress, accessibility, energy efficiency, structures and materials.

Building Rehabilitation and Energy Retrofit

This course will examine three integrally related topics: 1) the re-development process by which existing building stock is rehabilitated, 2) construction issues specific to the rehabilitation of existing buildings and 3) energy retrofit, which includes sustainability and related strategies. ADC 286 will introduce students to a broad array of tools, including construction management techniques and methods, energy audits and retrofits as well as public and private financing options and project management relative to building rehabilitation for both small and large scale projects, especially in urban neighborhoods.

Contact

*Miles Grosbard, R.A., Associate Professor, Architecture, Design and Construction
& Head, Department of Architecture, Design and Construction*

Community College of Philadelphia
1700 Spring Garden Street
Philadelphia, PA 19130
215-751-8010
www.ccp.edu

SALEM COMMUNITY COLLEGE (NJ)

Mission Statement

Salem Community College believes in the value of education and that your success is our success. The college is committed to meeting the ever-changing needs of a diverse community by providing accessible and affordable educational experiences in a dynamic learning environment that incorporates standards of excellence.

Profile

Salem Community College is a public, two-year comprehensive associate degree granting institution located in southern New Jersey. Established by the Board of Chosen Freeholders in 1972, SCC is authorized to grant associate degrees (A.A., A.S., A.F.A. and A.A.S.) and certificates in over 40 liberal arts, business, and practical nursing and technology programs of study. SCC is the only higher educational institution located in Salem County. SCC offers many of its noncredit career programs at its Salem Center which also houses the county's One-Stop Career Center. In addition, the College has three off-site instructional locations dedicated to specific programs. Salem Community College is fully accredited by the Middle States Commission on Higher Education.

GPIC-Related Course Offerings

Sustainable Energy Technology

The Sustainable Energy Technology program prepares students to move directly into the workforce upon graduation. Students will be qualified for entry-level positions in sustainable energy fields such as, wind, photovoltaic solar, biofuels and gasification. Courses provide students with a solid foundation in basic scientific principles as well as mathematics. Students are exposed to the theory, materials and equipment necessary to work in the field.

Energy Auditing

The Career Certificate in Sustainable Energy Technology: Energy Auditor follows the Building Performance Institute's (BPI) certification programs and requirements. Beginning with the BPI Building Analyst certification and continuing with the Envelope Professional certification, these programs provide a quick pathway to a career in the energy efficiency profession. The course work follows the recommended BPI test knowledge lists and is provided to students through classroom lectures, group project work and hands-on field experiences in energy auditing and building analysis.

Photovoltaic Systems

The Career Certificate in Sustainable Energy Technology: Photovoltaic Systems follows the North American Board of Certified Energy Practitioner's (NABCEP) requirements for completion of the Solar Photovoltaic entry-level exam and the Solar Photovoltaic installer exam. Beginning with the training to successfully take the entry-level photovoltaic examination, students are prepared through lectures, group project work and hands-on field experience in designing and installing a solar photovoltaic electrical system.

Principles of Building Construction

Introduce students to the concepts of building construction and in how they relate to fire services. Students develop a working knowledge of how buildings are designed, constructed, altered and come into disrepair. Students also develop a working knowledge of construction terms and different types of construction material. With this knowledge, students will be able to develop a plan to attack a fire with effective tactics that will not jeopardize the safety of firefighters.

Contact

Ray Constantine

Salem Community College
460 Hollywood Avenue
Carney's Point, NJ 08069
856-299-2100
www.salemcc.edu

Educational Programs in Four-year GPIC Partner Institutions

CARNEGIE MELLON UNIVERSITY

Mission Statement

To create and disseminate knowledge and art through research and creative inquiry, teaching, and learning, and to transfer our intellectual and artistic product to enhance society in meaningful and sustainable ways. To serve our students by teaching them problem solving, leadership and teamwork skills, and the value of a commitment to quality, ethical behavior, and respect for others. To achieve these ends by pursuing the advantages of a diverse and relatively small university community, open to the exchange of ideas, where discovery, creativity, and personal and professional development can flourish.

Profile

Carnegie Mellon University is a global research university with more than 11,000 students, 86,500 alumni, and 4,000 faculty and staff. Recognized for its world-class arts and technology programs, collaboration across disciplines and innovative leadership in education, CMU is consistently a top-ranked university.

CMU is one of the fastest growing entrepreneurial institutions in the U.S. The university recently launched Greenlighting Startups – a new initiative accelerating CMU’s record of turning innovations to new business. CMU consists of seven schools and colleges: Carnegie Institute of Technology, College of Fine Arts, College of Humanities and Social Sciences, Heinz College, Mellon College of Science, School of Computer Science and the Tepper School of Business.

GPIC-Related Course Offerings

Project Management for Construction

Introduction to construction project management from owner’s perspective in organizing planning, design, construction and operation as an integrated process. Examination of labor productivity, material management and equipment utilization. Cost estimation and financing of constructed facilities. Contracting, construction planning and fundamental scheduling procedures. Cost control, monitoring and accounting for construction.

Geotechnical Engineering

Behavior of geotechnical structures; engineering design of geotechnical structures considering failure modes; uncertainties; economic issues, required design formats and relevant code provisions; performance requirements for foundations, subsurface investigations; allowable stress and LRFD design approaches; reliability-based design; shallow foundations; deep foundations; retaining structures; reinforced concrete foundations.

Energy and the Environment

Fuel cycles for conventional and non-conventional energy resources; relationships between environmental impacts and the conversion or utilization of energy; measures of system and process efficiency; detailed study and analysis of coal-based energy systems including conventional and advanced power generation, synthetic fuels production, and industrial processes; technological options for multi-media (air, water, land) pollution control; mathematical modeling of energy-environmental interactions and tradeoffs and their dependency on technical and policy parameters; methodologies for energy and environmental forecasting; applications to issues of current interest.

LEED Buildings and Green Design

Green building and sustainable design have been rapidly gaining acceptance in all sectors of the building market. Global issues of energy use, emissions, resource depletion, and land use are forcing building professionals to re-evaluate standard design and construction processes, and look to more environmentally friendly practices. The U.S. Green Building Council (USGBC) developed green building rating systems entitled Leadership in Energy and Environmental Design (LEEDTM) in order to define “green building” by establishing a common standard of measurement. LEED considers green building methods and technologies in several categories including site, water, energy, materials, and indoor air quality, and awards points towards an overall green building rating of certified, silver, gold or platinum. Currently, LEED registered projects make up 3% of the current U.S. commercial building market, and Pennsylvania is the third leading state with LEED registered projects. There is now a demand for design professionals with knowledge and experience not only in sustainable design but specifically with the LEED rating system as well. This course will provide students with background knowledge of the USGBC, the LEED system, as well as referenced standards related to specific topics. The course will benefit greatly from the large number of LEED projects in the Pittsburgh region, which will serve as case studies. Upon completion of the course, students will be prepared to take the LEED Professional Accreditation Exam, which is quickly becoming the standard of recognition for green building professionals.

Design and Construction

Introduction to steel, concrete, wood, and masonry construction methods and material selection; integration of design and constructability criteria; conformance of designs to applicable building and fire codes; preparation of plans and specifications; laboratory demonstration and experiments.



Architecture Design Studio: Systems Integration

In today's climate of complex clients and large-scale architecture, design students research and discuss broad political, economic, infrastructure, management and operational systems. Following this theme and in the students' quest of building integration, they examine the complex interrelationships between performance criteria, building subsystems and their integration, specification, and evaluation. This studio is concerned with the detailed design development relating to the spatial, visual, acoustic and thermal performance of complex buildings as well as the long-term integrity of the integrated systems. Students achieve design integration of at least two building systems and their interdisciplinary objectives - structure, enclosure, interior, mechanical, communications and information, and the safety systems—addressing issues of constructability and technical innovation while combined with suitability to the user, studied in the previous semester of Occupancy.

Environment I: Climate & Energy

Environmental Systems is a required course taught in the third year. This course introduces architectural design responses for energy conservation, human comfort, and the site-specific dynamics of climate. Students are expected to combine an understanding of the basic laws of comfort and heat flow with the variables of local climate to create regionally appropriate energy design guidelines for their design projects. The state of the art in building energy conservation and passive heating and cooling technologies, as well as the emerging field of sustainable design are presented, with take-home readings and assignments. To stress the significance of architectural design decision making on energy consumption and comfort, full design specifications and hand calculations are completed individually by each student for a residential-scale building. Students compile a professional energy consultant's report, designing the most viable energy

conservation retrofit measures for their client from: siting, massing, organization, enclosure detailing, opening control, to passive system integration and management. An overview of world energy consumption in buildings and energy design standards is challenged by lectures on building energy conservation successes and competitive challenges of sustainability. The course ends with a focus on the design integration of natural conditioning systems and the potentially dynamic interface of mechanical systems in small- and large-scale buildings.

Environment II: Mechanical Systems

Mechanical Equipment is a study of the mechanical systems required to heat, cool, ventilate, wire and plumb a building. Students will focus on energy usage and savings for buildings along with a look at the various system types and equipment used – past, present, and future. The course parallels the AIA review class for the professional license examination, and should become a future study guide for the exam.

Contact

Samuel Boyer

Carnegie Mellon University
5000 Forbes Avenue
Pittsburgh, PA 15213-3890
412-268-2481
www.cmu.edu

Mission Statement

To serve our students and society through comprehensive integrated academic offerings enhanced by technology, co-operative education, and clinical practice in an urban setting, with global outreach embracing research, scholarly activities, and community initiatives

Profile

Founded in 1891 in Philadelphia, Drexel is a top-ranked, comprehensive university recognized for its focus on experiential learning through co-operative education, its commitment to cutting-edge academic technology and its growing enterprise of use-inspired research. With more than 23,500 students, Drexel is the nation's 14th largest private university and ranked sixth among national universities in the most recent U.S. News & World Report list of "Up-and-Comers."

Drexel offers a variety of educational and employment opportunities to students through study and internship programs in Europe, Asia, and Latin America, and the co-operative education ("co-op") program. The only mandatory co-op in Pennsylvania and one of three in the United States, Drexel's program is among the nation's oldest, largest, and most respected.

GPIC-Related Course Offerings

Introduction to Construction Management

This course will introduce the basic history and management concepts of the construction industry to students with the expectation that upon completion students will have an overview of the industry. Career choices, industry firms, and key players in the Construction Management process will be explored.

Building Materials and Construction Methods I

This course is designed to explore the range of building materials in use today and their interrelationships in a construction project. Topics will include a study of the major components of construction materials, the selection process, specification, alternatives, procurement, placement and quality management for the building systems covered. Foundations, excavations, wood framing and steel construction and the role these materials play in the success of a project once chosen will be considered and evaluated.

Building Materials & Construction Methods II

Covers concrete, reinforced concrete, site cast and pre-cast concrete, brick and concrete masonry, reinforced masonry, and properties of these materials and construction methods associated with them.

Building Materials & Construction Methods III

Continues CMGT 162. Covers roofing systems, glass, glazing, windows, doors, cladding systems, interior finishes, the properties of these materials and construction methods associated with each of them.

Construction Safety

Covers OSHA liability, general safety, hazard communication, fire, material handling, tools, welding, electricity, scaffolding, fall protection, cranes, heavy equipment, excavation, concrete, ladders and stairways, confined space entry, personal protective equipment, and health hazards. Course approved by the OSHA Training Institute.

Building Codes

Familiarizes students with the content of the BOCA International Building Code (emphasizing the non-structural provisions), the purpose and intent of code requirements, and how to apply the code to structures and occupancies. Examines how the code is used as a tool in design and construction and prepares students for the advent of a single model building code planned for the nation.

Information Technologies in Construction

The objective of this course is to expose students to a large variety of information technologies in construction and will discuss the impact of these technologies on work environments, processes, and work quality. Students will investigate a variety of issues surrounding IT in construction including implementation, standards, integration, knowledge management and the underlying technology.

Building Systems I

This course covers construction management and design concepts relating to heating, ventilation, and air conditioning systems and the integration of these systems into the building design and construction process.

Building Systems II

This course covers construction management concepts relating to electrical systems, wiring, lighting, signal and data systems, and transportation systems and the integration of these into the building design and construction process.

Sustainable Principles & Practices

This course addresses the fundamentals of green building concepts and practices underlying sustainable construction from the perspective of the LEED Green Building rating system.



Interior Design Courses

Graduate Studio A

Investigates the manipulation of the spatial volume within the context of a small-scale environment. Covers diagramming, parts and design concept for complex spatial requirements with elements such as partitions, heating/ventilating and cooling, lighting and plumbing. Graphic communication through digital and multimedia. Professionally juried.

Graduate Studio B

Focuses on design of a small-scale interior with emphasis on programmatic requirements leading to a synthesized and identifiable environment. Studies concept and design development; programming; space planning; selection of furniture, finishes and equipment; lighting systems; architectural details; code compliance and presentation. Professionally juried.

Introduction to HVAC

This course includes a review of thermodynamics, moist air properties and processes, basic heat transfer, solar radiation, heating and cooling losses and load calculation, types of air conditioning systems, infiltration and ventilation, air motion and distribution.

Architectural Illumination & Elect Sys

This course covers building electrical systems, including power demand, distribution and control; building illumination techniques, including lighting demand, layout and energy analysis.

Architectural Engineering Design I

Establishes a base of building systems design concepts, knowledge and performance criteria, with emphasis on the thermal, electrical, illumination and structural aspects of buildings.

Architectural Engineering Design II

Emphasizes the development of insight into the solution of building system design problems, development of in-depth understanding of building systems design synthesis, and integration in a single building of modest scale and complexity

HVAC Loads

Human comfort and associated models; state-of-the-art methods of calculating building peak heating and cooling loads; analysis of different psychrometric processes; different types of secondary systems: description, operating principles, modeling and simulation.

Contact

Bruce Eisenstein

Drexel University
3141 Chestnut Street
Philadelphia, PA 19104
215-895-2000
www.drexel.edu

Mission Statement

Morgan State University serves the community, region, state, nation, and world as an intellectual and creative resource by supporting, empowering and preparing high-quality, diverse graduates to lead the world. The University offers innovative, inclusive, and distinctive educational experiences to a broad cross section of the population in a comprehensive range of disciplines at the baccalaureate, master's, doctoral, and professional degree levels. Through collaborative pursuits, scholarly research, creative endeavors, and dedicated public service, the University gives significant priority to addressing societal problems, particularly those prevalent in urban communities.

Profile

Founded in 1867 as the Centenary Biblical Institute by the Baltimore Conference of the Methodist Episcopal Church, the institution's original mission was to train young men in ministry. It subsequently broadened its mission to educate both men and women as teachers. The school was renamed Morgan College in 1890 in honor of the Reverend Lyttleton Morgan, the first chairman of its Board of Trustees, who donated land to the college.

For over 140 years, Morgan State University has been an important part of the higher education system in Baltimore City, the State of Maryland, and the nation. Throughout its history, Morgan has served the community with distinction while meeting the educational needs of an increasingly diverse society. Its designation as Maryland's Public Urban University assures that Morgan will continue to play a prominent role in Maryland's education future.

GPIC-Related Course Offerings

Architecture & Design II (Site & Structure)

This studio course will expand on the fundamental design principals from ARCH 201 and introduce physical and environmental concerns to the design of sites, buildings, and interior spaces. Students will analyze traditional and vernacular design precedents to understand their material properties, structural concepts, as well as responses to site, environmental and cultural factors. Students will apply the lessons of structure and material, and environmentally responsive design to a series of studio projects of increasing complexity.

Construction Observation

This one credit lecture class will provide the opportunity for students to visit a construction site of a project on campus (The new CBEIS Building) on a weekly basis to both observe the actual progress of construction and learn about the construction management and construction administration processes.

Building Materials

Two hours' lecture, two hours' lab; 3 credits. This course will introduce methods and materials commonly used in building construction as well as criteria for their evaluation and selection as part of the building design process. Students will become familiar with common building practices within our region as well as their environmental impact and alternative sustainable technologies.

Introduction to Construction Management

Three hours; 3 credits. This course is an introduction to basic principles and skills required to organize and manage large construction projects, including the issues of liability and coordination responsibilities of the owner, project manager, general contractor, sub-contractor, and design professionals.

Construction Operations

This course introduces the basic principles and elements required to organize, operate and manage small-, medium-, and large-sized construction companies. It focuses on the operation from the executive perspective: contractual responsibilities and the roles of contractor owner, and design and engineering professionals. It also explores the issues of labor relations and dispute resolution.

Sustainability

This course explores “green technology” as well as the relationship between the built environment and such vital challenges as energy consumption, power supply, alternative energy sources, and building materials. Students further examine the social, ecological, and economic impact of built form on the environment by studying the relationship among natural, biological, ecological processes, urban sprawl, and environmental resources. The content of this course will be examined through the lens of the following six principles of “green design:” conserving energy, working with climate, minimizing new resources, respect for users, respect for site and holism.

Building Structural Systems

This course will familiarize students with common Building Structural Systems including masonry, wood, steel, and concrete. Students will gain a conceptual understanding of how these systems perform as well as a familiarity with the organization, components, sizes, connections, methods of assembly, resistance to horizontal forces, cost and other factors affecting their application in buildings.

Environmental Controls

This course covers basic principles of plumbing, HVAC systems, electric, illumination, and acoustics in environmental design and construction. It expands the student's understanding of the nature and characteristics of various environmental systems as well as to develop their ability to make choices between systems that best resolve the problems associated with cost, social accommodation, operating efficiency, durability, scheduling, safety, and aesthetics.



Advanced Building Structures

This course will look at advanced and non-traditional building structural systems and material applications. Sources will include structures found in nature, traditional and non-western structures and contemporary explorations in structural design. The course involves a lab in which students will use the schools model shop to develop and test designs of structural materials and assemblies.

Contact

Avis Ransom

Morgan State University
1700 East Cold Spring Lane
Baltimore, MD 21251
443-885-3333
www.morgan.edu

Mission Statement

The mission of the curriculum at both the undergraduate and graduate levels has been and will continue to be to prepare students with the skills and knowledge necessary for employment in a “generalized” design practice or pursue research immediately upon graduation. To that end, the vision of CoAD is the creation and implementation of a new curriculum that addresses the changing technological and professional demands in the 21st century as well as satisfying the mandates required for accreditation by the National Architecture Accreditation Board (NAAB), Council on Interior Design Accreditation (CIDA) and National Association of Schools of Art and Design (NASAD.)

Profile

The College of Architecture and Design offers students numerous opportunities for academic, professional and personal growth. Students are exposed to a variety of experiences – both cultural and professional – to prepare them for success in a global society.

Design has always had dual aspects as an academic discipline and a profession, each of which requires of its practitioners an ongoing immersion in intellectual, creative and technical exploration. In crafting an educational curriculum and pedagogy, CoAD is mindful that this duality offers a beneficial range of entry points and opportunities for growth to students, who bring to the School a rich diversity in background and personal circumstances.

The goal is to nurture our students’ loftiest ambitions while providing the skill sets necessary to succeed in architecture and related fields. Students who enroll in CoAD have made a career choice. The aim is to educate a complete professional – one who is competent in one or more of the design fields and who also plays a proactive professional role within a total social, economic, and technological context.

GPIC-Related Course Offerings

Certificate in Construction Management

This certificate trains individuals for highly skilled jobs in general contracting, heavy/highway and building construction, mechanical and electrical contracting, and construction management. This certificate teaches managerial aspects of contracting and the study of an individual firm in relation to the entire construction industry. Topics include contractor organization and management, legal aspects of construction, and financial planning. In addition, this graduate certificate will allow professionals to specifically focus in on the legal aspect of Environmental Engineering, Construction Management or Legal, Ethical and Intellectual Property Issues for Engineering Managers

Environmental Design

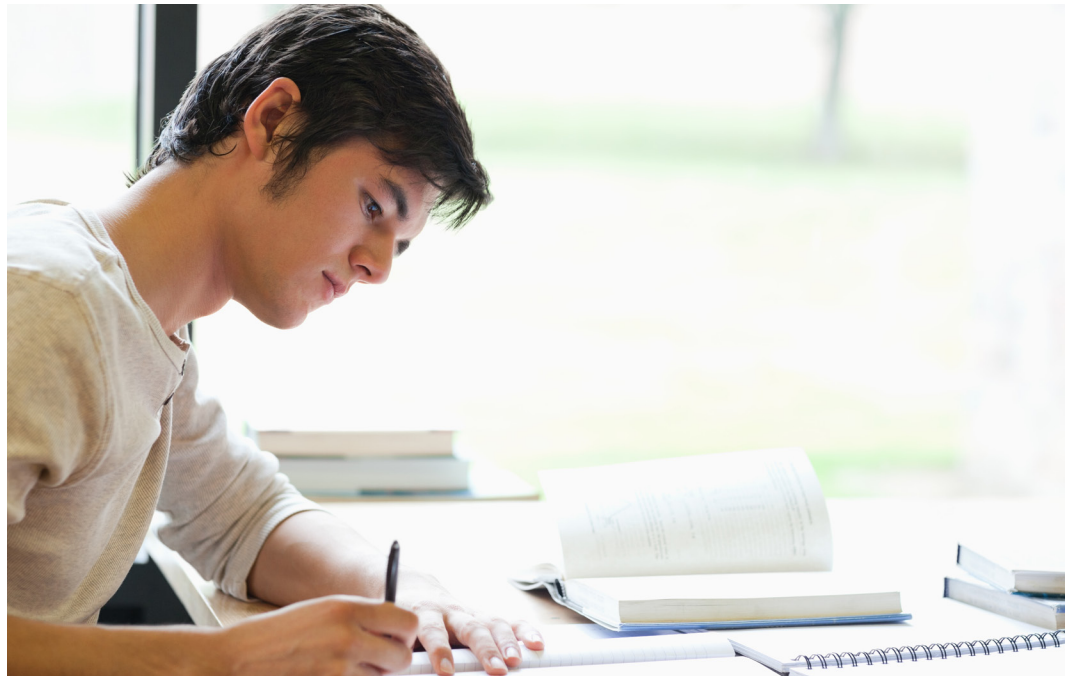
An introduction to the social and political dimensions of sustainability at local, national, and international scales. Attention is focused on the formulation of strategies to enhance the performance of contemporary systems of production and consumption, building design processes, and urban and regional planning. From the perspective of ecological modernization, the course considers developments in such areas as industrial symbiosis, product-service systems, and corporate environmental and social responsibility, as well as ongoing debates over the balance between efficiency and sufficiency in the pursuit of sustainability.

Introduction to Sustainable Architecture

This course introduces the environmental design of buildings. The five characteristics of sustainable design – Green Buildings – are: sustainable sites; water efficiency; energy and atmosphere; materials and resources; and indoor environmental quality. The US Green Building Council's Green Building Rating System is used as the framework. Several sustainable exemplary major buildings will be reviewed. The objectives are to affect an understanding of sustainable design characteristics and how to program and design a green building. Each characteristic is defined by the necessary measures and the option alternatives in the certification guidelines. The strategy is to select the necessary measures and at least two of the options under each of the characteristics for an in depth understanding of the design issues and applications. For example storm water management, reduced heat island effects, and energy efficiency can be implemented by designing a green roof for a building. Daylight lighting design has an impact on indoor environmental quality.

Sustainable Design of Energy Efficient Buildings

In high performance buildings, energy efficient design begins with a methodical reduction of the building's heating and cooling loads – those imposed by climate and those generated by people, lights, and equipment. With all loads minimized, mechanical systems can then be selected based on highest output for lowest fuel consumption. Computer software that will predict energy costs for a proposed building design will be introduced. This energy software, essential in the analysis of energy efficiency measures, facilitates informed decision making through the course of the design process. Renewable energy technologies reduce our reliance on fossil fuels and help alleviate carbon dioxide and other greenhouse gas emissions. The technologies of passive solar design and building integrated photovoltaics will be discussed highlighted.



Indoor Environmental Quality in Sustainable Designed Buildings

High performance buildings reflect a concern for the total quality of the interior environment. Supportive ambient conditions, including thermal comfort and acceptable indoor air quality, visual comfort, and appropriate acoustical quality will be discussed. Increased attention to these environmental features can boost quality of life in the workplace by improving overall physiological and psychological well-being. The class will learn that accountable for improving building interiors, clients can achieve better human resource outcomes including: reduced occupant complaints, lower rates of absenteeism, improved occupant health, avoidance of sick building syndrome, and potentially improved occupant performance.

Sustainable Design with Efficient Materials and Resources

Materials efficiency refers specifically to waste reduction including construction and demolition reduction, reuse and recycling. Students will understand building products that are manufactured in ways that conserve raw materials, energy and water, that are reused or salvaged, or that can be recycled or reused at the end of the building's service life. The technologies and techniques used to conserve water; especially landscaping, water treatment, and recycling strategies will be used to help instruct about ecology and the environment. Opportunities to save water through water reclamation, gray water systems, and low-flow devices are discussed. Environmentally sensitive site design for projects located in urban, suburban, or rural settings will be addressed. The overall issues involve disruption and displacement of wildlife habitat, increased erosion, diminished ground water recharge, and threats to the water quality of surface water bodies and aquifers. Procedures will be described that aid resource conservation and limit damage to the site during construction.

Building Systems

Building Systems I: Intro. to Building Technologies

This course is an introductory survey of the general principles and application of Sustainable Design, Site Systems, Structural Systems, Environmental Systems, Envelope Systems, Materials and Assembly Systems. This course will primarily focus on low-rise wood and steel structures.

Building Systems II: Integrated Building Technologies Continuing Systems I

This course is an introductory survey of the interrelationship of the principles and applications of Sustainable Design, Site Design, Structural Systems, Environmental Systems, Envelope Systems and Materials and Assembly Systems. This course will primarily focus on low and medium-rise concrete and masonry structures and is coordinated with a studio design/build experience.

Building Systems III (Prerequisite: Arch 226

An introductory survey of the basic principles of building, environmental control, and service systems as these relate to the building envelope, this course will primarily cover thermal enclosure, climate modification, environmental systems, energy use, and sustainable design. It also introduces the principles of health and safety in the design of buildings.

Contact

Nancy Coppola

New Jersey Institute of Technology
323 Martin Luther King Blvd.
Newark, NJ 07102-1982
973-596-3078
www.njit.edu

PRINCETON UNIVERSITY

Mission

The mission of Campus Life is to further develop a humane and collaborative environment that serves the educational mission of the University by encouraging, supporting and celebrating intellectual curiosity, active citizenship, ethical leadership and respect for our diverse community.

Profile

Princeton University is a vibrant community of scholarship and learning that stands in the nation's service and in the service of all nations. Chartered in 1746, Princeton is the fourth-oldest college in the United States. Princeton is an independent, coeducational, nondenominational institution that provides undergraduate and graduate instruction in the humanities, social sciences, natural sciences and engineering. As a world-renowned research university,

Princeton seeks to achieve the highest levels of distinction in the discovery and transmission of knowledge and understanding. At the same time, Princeton is distinctive among research universities in its commitment to undergraduate teaching.

Today, more than 1,100 faculty members instruct approximately 5,000 undergraduate students and 2,500 graduate students. The University's generous financial aid program ensures that talented students from all economic backgrounds can afford a Princeton education.

GPIC-Related Course Offerings

Analysis of Buildings

Investigating the rich interplay between form, space, skin, structure, material assembly, performance and representation, this course seeks to develop creative and productive approaches for analyzing very recent buildings. The past decade has witnessed the realization of a wealth of buildings, which has been documented in over-sized books, design blogs, and glossy magazines but not carefully dissected with inventive analytical tools. This analysis will be positioned within the context of the history of building analysis, and buildings key to that history.

Design of Large-Scale Structures: Buildings

The design of large-scale buildings is considered from the conceptual phase up to the final design phase. The following issues are addressed in this course: building types, design codes, design of foundations, choice of different structural systems to resist vertical and horizontal loads, choice between different materials (steel versus concrete), design for wind and earthquake loading, construction management, and financial and legal considerations are examined in detail. Several computer codes for analysis and design of buildings are used in this course.

Integrated Building Systems

An introduction to building systems and the methods of construction used to realize design in built form. First half of the course will be an overview of the primary systems, materials and principals used in construction of buildings and the fabrication of elements, through lectures and accompanying lab sessions. The second half will be an explanation of the means by which information is communicated from designers to fabricators, current standards in the practice of architecture, and practice's relation to changes in methods of fabrication and project delivery.

The Environmental Engineering of Buildings, Part II

Study and evaluation of mechanical and electrical system applications for different building types, including air conditioning, electrical, plumbing and telecommunications. Emphasis on design integration with architecture and structure within the construction process including sustainable design and energy conservation. Introduction to vertical transportation, life safety systems, and intelligent buildings. Emphasis on a conceptual approach using case studies and field trips.

Structures and the Urban Environment

This course focuses on structural engineering as a new art form begun during the Industrial Revolution and flourishing today in long-span bridges, thin shell concrete vaults, and tall buildings. Through laboratory experiments students study the scientific basis for structural performance and thereby connect external forms to the internal forces in the major works of structural engineers. Students examine contemporary exemplars that are essential to the understanding of 21st century structuring of cities with illustrations taken from various cities in the U.S. and abroad.

Mechanics, Materials and Structures

The Program in Mechanics, Materials, and Structures (MMS) integrates cutting-edge research in structural engineering and design with new sensors for structural health monitoring, advanced computational methods, materials science and engineering, and risk assessment. The Program builds on diverse strengths of its faculty members to provide an outstanding educational experience. Within the Department of Civil and Environmental Engineering, the MMS program is paired with the Program in Environmental Engineering and Water Resources (EEWR) to provide the two main tracks that departmental graduate students can pursue.

Current areas of research related to structures include analysis and design of structures in seismically active areas; vulnerability of buildings to progressive collapse; response of structures to extreme loads including impact loading, blast loading, and fires; efficient design of buildings including form-finding designs; and active projects at the intersection of structures and art, in a field called Structural Art.

Contact

H. Vincent Poor

Princeton University

Princeton, NJ 08544

609-258-3000

www.princeton.edu

Mission

At Purdue, integrity is indispensable to our mission. We act with honesty and adhere to the highest standards of moral and ethical values and principles through our personal and professional behavior. We demonstrate our understanding of these values and principles and uphold them in every action and decision. Trust and trustworthiness go hand in hand with how we conduct ourselves, as we sustain a culture that is based upon ethical conduct. We expect our actions to be consistent with our words, and our words to be consistent with our intentions. We accept our responsibilities, share leadership in a democratic spirit, and subject ourselves to the highest standards of public trust. We hold ourselves accountable for our words and our actions.

We champion freedom of expression. To ensure our integrity, we safeguard academic freedom, open inquiry, and debate in the best interests of education, enrichment, and our personal and professional development. We embrace human and intellectual diversity and inclusiveness. We uphold the highest standards of fairness, act as responsible citizens, respect equality and the rights of others, and treat all individuals with dignity.

Profile

Purdue University is a coeducational, state-assisted system in Indiana. Founded in 1869 and named after benefactor John Purdue, we are one of the nation's leading research institutions with a reputation for excellent and affordable education. We are accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools. Our West Lafayette campus offers more than 200 majors for undergraduates, over 70 masters' and doctoral programs, and professional degrees in pharmacy and veterinary medicine. In addition, we have 18 intercollegiate sports teams and more than 850 student organizations.

GPIC-Related Course Offerings

Construction Engineering

Construction engineers design and execute processes for building and maintaining the infrastructure of our world. The tools of the trade for today's successful construction engineer include the following: strong math, science, and computer skills; creativity; an aptitude for applying science and engineering methods to solve problems; a love of building structures such as bridges, airports, buildings, dams, and highways; an interest in working indoors and outdoors; initiative and a strong work ethic; the ability to collaborate with diverse people; good communications skills; and a desire to learn in a constantly changing environment. Students in the Construction Engineering program have the opportunity to develop additional expertise in mechanical, electrical, and other areas of engineering through minors in these fields. Construction Engineering students complete three 12-week internships, usually during the summer and away from home. They work as paid employees of construction contractors and construction managers and perform increasingly responsible duties in field operations, office operations, and project management.

Building Construction Management

Building Construction Management prepares students for a challenging and rewarding career in management within the construction industry. Students who obtain a building construction management degree learn to organize, lead, and manage the people, materials, and processes of construction utilizing the latest technologies within the industry.

Electrical Construction Management

The goal of the Electrical Construction Management (ECLM) concentration program is to provide a higher level of education for those Building Construction Management (BCM) students who are interested in the field of Electrical Construction. Specific electrical coursework in the areas of estimating, scheduling, project management, and design will provide the student with the necessary skills required for entry-level positions in the electrical construction industry.

Green Manufacturing

The Green Enterprise Development (GreenED) workforce training program is intended for organizations interested in effectively and efficiently applying the latest environmentally friendly practices. Through management and worker empowerment, this green manufacturing training program can transform your organization into one that is leaner, greener and more profitable by giving your team the knowledge and skills they need to implement projects that successfully reduce costs and environmental impacts.

Contact

Danita Brown

Purdue University
475 Stadium Mall Dr.
West Lafayette, IN 47907-2050
765- 494-1776
www.purdue.edu

Mission Statement

As the sole comprehensive public research university in the state's system of higher education, Rutgers, The State University of New Jersey, has the threefold mission of:

- Providing for the instructional needs of New Jersey's citizens through its undergraduate, graduate, and continuing education programs;
- Conducting the cutting-edge research that contributes to the medical, environmental, social and cultural well-being of the state, as well as aiding the economy and the state's businesses and industries; and
- Performing public service in support of the needs of the citizens of the state and its local, county, and state governments.

Profile

Rutgers is the only university in the nation that is a colonial college, a land-grant institution, and a leading public research university. It is the nation's eighth oldest institution of higher learning—one of only nine colonial colleges established before the American Revolution—and has a centuries-old tradition of rising to the challenges of each new generation.

In 1989, Rutgers was invited to join the Association of American Universities, making Rutgers one of the top 61 research universities in North America. Today, with more than 58,000 students, Rutgers is one of the largest and most diverse public research universities in the nation.

GPIC-Related Course Offerings

Facilities Layout and Materials Handling

This course will introduce the student to the fundamentals of the design, layout, and location of industrial and nonmanufacturing facilities. The course is divided into three parts. The first part focuses on the determination of the requirements for equipment, space and material in the facility. The second part presents a variety of quantitative approaches that can be used to model specific aspects of facilities planning problems. The third part presents techniques to facilitate the generation of facilities plans and deals with the treatment of facilities planning.

Production & Manufacturing Engineering

The ISE department provides state-of-the-art teaching and research in production and manufacturing at both the undergraduate and graduate levels. The faculty is involved in several research projects for the National Science Foundation, Department of Defense, Defense Advanced Research Projects Agency, Office of Naval Research, European Commission, NJ Space Grant Consortium and industrial companies. Advanced undergraduate students and graduate students have an opportunity to work with faculty members on some of their projects. In both teaching and research, the ISE department addresses such issues as:

- Designing and implementing new technology to reduce manufacturing costs and increase productivity.
- Integrating decision making in manufacturing, production planning and distribution.
- Designing control systems using programmable controllers and computers for manufacturing operations.
- Designing enterprise-wide database information systems for manufacturing control and business processes.
- Implementing and optimizing layered manufacturing processes.
- Applying laser materials processing and micromachining in industrial processes.
- Designing manufacturing systems in the batch process industries, especially food and pharmaceutical industries.
- Development of workpiece material and friction models for simulation of machining of aerospace alloys.
- Predictive modeling and optimization of machining operations

Materials Science and Engineering

Materials engineers and scientists study the synthesis, processing, and characterization of substances within these general classes of materials: Polymers, Metals, Semiconductors, Ceramics, Glass, and Composites. An understanding the molecular structure and well-designed processing are the keys to engineering materials with outstanding properties.

Novel materials are tailored to meet the needs of targeted applications and become the foundation for all engineering disciplines. Such materials enable many new technologies and are found in various forms in electronics, optics, architecture & transportation, biomedicine, aviation & aerospace, pharmaceuticals, energy generation, environmental engineering, and numerous industrial systems.

Contact

Richard McCormick

Rutgers University
83 Somerset Street
New Brunswick, NJ 08901
848-932-5935
www.rutgers.edu

Mission Statement

The mission of the Penn State Institutes of Energy and the Environment is to expand Penn State's capacity to pursue the newest frontiers in energy and environmental research by encouraging cooperation across disciplines and the participation of local, state, federal, and international stakeholders.

We are:

- The central coordinating structure for energy and environmental research, education, and outreach at Penn State
- A dynamic, tightly coupled, intercampus network of expertise and infrastructure recognized worldwide as a seedbed of knowledge and ingenuity needed to deal with energy and environmental challenges
- A novel partnership between Penn State administration and faculty designed to increase the visibility and stature of Penn State programs in the energy and environmental arena

Profile

From agricultural college to world-class learning community -- the story of The Pennsylvania State University is one of an expanding mission of teaching, research, and public service. But that mission was not so grandly conceived in 1855, when the Commonwealth chartered the school at the request of the Pennsylvania State Agricultural Society. The goal was to apply scientific principles to farming, a radical departure from the traditional curriculum grounded in mathematics, rhetoric, and classical languages.

Penn State has continued to respond to Pennsylvania's changing economic and social needs. In 1989 the Pennsylvania College of Technology in Williamsport became an affiliate of the University. In 1997, Penn State and the Dickinson School of Law joined ranks. And Penn State's new World Campus, which graduated its first students in 2000, uses the Internet and other new technologies to offer instruction on an "anywhere, anytime" basis.

The Green Careers initiative is offered in partnership with the Penn State Career Services Center. In addition to the series of live networking events, such as the Green Careers Leadership Symposium, the Center for Sustainability offers online information about green careers for students of all majors.

Penn State students get involved in sustainability issues in many different ways. Depending on students' specific interests and skills, Center for Sustainability staff direct them to appropriate opportunities on and off campus.

GPIC-Related Course Offerings

Building Engineering Technology

This major is designed to provide technically trained personnel between the level of high school graduate and professional engineer or architect to support the architectural design/construction industry, and technical support firms.

Architectural Engineering Technology Option

This option helps prepare students to translate sketches and design concepts into working drawings and specifications, and to work with architects, structural engineers, and all phases of the building/construction industry.

This major emphasizes the application of scientific and engineering principles to the planning, design, and construction of buildings and building systems. The goal of the program is to provide engineering graduates with the best education available for careers in the building professions. Graduates will have the ability to practice as registered professional engineers in a variety of areas, both public and private, related to the planning, design, construction, and operation of buildings and to assume a place of leadership in society.

Four options are available in the ten-semester major: the Construction option, which emphasizes building construction engineering and construction management; the Lighting/Electrical option, which emphasizes the design of lighting and electrical systems for buildings; the Mechanical option, which emphasizes the design of heating, ventilating and air-conditioning systems in buildings; and the Structural option, which emphasizes the analysis and design of building structural systems. Courses in architectural design are included in all options to give the engineering student an understanding of architectural design and its relation to engineering. Courses in engineering design are provided throughout the program. The design experience is culminated in a year-long capstone design course.

Building Environmental Systems Technology Option

This option helps prepare students for the heating, ventilating, air conditioning, and refrigeration (HVAC&R) industry as system designers, equipment sales representatives, building automation supervisors, and indoor air quality specialists.

Energy Engineering

The undergraduate program in energy engineering is designed to reflect the growing impact and demand for energy in society and to equip students with the knowledge necessary to achieve the following career and professional accomplishments or program educational objectives: become valuable contributors in addressing society's energy needs and demands; successful leaders in advancing the technology and management of energy;

innovators and entrepreneurs in the energy sector; and educators, practicing engineers, and national leaders on energy and associated environmental, health and safety, and policy and economics issues. The program integrates skill sets in the physical sciences (chemistry, engineering, mathematics, and physics) and social sciences (economics, policy, and management) to ensure successful career opportunities and growth within energy-related industries, government agencies, and academia.

Structural Design and Construction Engineering Technology

The program in Structural Design and Construction Engineering Technology provides the basic education required for the structural engineer and construction profession. Students learn the basic general engineering concepts needed for this major with emphasis on the fundamentals, structural design principles, and construction techniques through required course work. They are given the opportunity to focus in a discipline of construction management or structural design through a selected option or choose a broad general option. Courses in communication skills, arts, humanities, social and behavioral sciences, and other engineering related areas broaden the program. Students gain experience in working as members of a team and in using interdisciplinary approaches to solve problems. These experiences, as well as those related to design and construction principles, are taught through exercises in the classroom, laboratory, and field. The program culminates with a capstone project course in which the students' knowledge and skills are applied to specific problems.

Structural Engineering

The Structural Engineering certificate program provides graduate-level study in the area of structural analysis and design. The flexibility of the program allows participants the opportunity to choose courses that will broaden their understanding and upgrade the specific skills which are essential to their jobs. The program is designed for structural and civil engineers and graduates of certain engineering technology programs who are interested in developing a deeper insight into the principles and applications of structural design as it relates to different types of structures and materials. Individuals who are, or plan to be, active in the structural design field (consulting engineers; local, state, or federal agencies; and other organizations) should benefit from these courses by keeping current with design and analysis procedures and broadening their education.

Green Courses for Building Industry Professionals

LEED—Leadership in Energy and Environmental Design—is a green building rating system developed and administered by the U.S. Green Building Council that is the recognized standard for measuring building sustainability. The LEED exam courses are developed for designers, architects, engineers and project managers. The LEED Green Associate examination prep course will highlight such topics as green building practices and principles, project site factors, water management, project systems and energy impacts, and acquisition, installation and management of project materials. The LEED-A+ course will provide an overview of LEED rating systems and examine sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality and innovation in design.

Green Advantage is a commercial construction program designed for builders, developers, contractors, subcontractors and suppliers. The course prepares participants for Green Advantage certification by helping them understand and enforce the core concepts and construction principles behind sustainable building, become knowledgeable about the LEED rating system, and learn how to be an effective partner with design professionals and achieve a LEED-rated building. What they learn will help them lighten the impact on the environment, save energy, and improve health conditions of construction workers and building occupants. Participants can become Green Advantage certified by successfully completing the 90-minute exam offered at the end of the course.

Contact

Joseph Cecere

The Pennsylvania State University
101 Hammond Building
University Park, PA 16802
814-863-3750
www.psu.edu



UNIVERSITY OF PENNSYLVANIA

Mission

The mission of the President's Center is to support the President, the trustees, and the officers of the University; to assist the faculty, students, and staff in their teaching, research, and service activities; and to advance excellence at Penn.

Profile

The University of Pennsylvania dates its founding to 1740, when a prominent evangelist, George Whitefield, and others established an educational trust fund and began construction of a large school building at Fourth and Arch streets in Philadelphia. The building was designed as a charity school for the children of working-class Philadelphians and as a house of worship for Whitefield's followers. Foundations were laid, and the walls of the "New Building," as it was called, began to rise. The cost, however, was much greater than the available resources, and the project went unfinished for a decade.

Since 1923, more than a dozen Penn scholars have been awarded the Nobel Prize. In 1994, Judith Rodin became the first woman to be inaugurated president of an Ivy League institution, and in 2004 Amy Gutmann became the first female Ivy League president to succeed another female. Penn's heritage is likewise reflected in its landscape, where a vibrant, 279-acre, urban campus boasts more than 180 buildings and many notable landmarks, including Houston Hall, the nation's first student union; Franklin Field, the country's first double-decked college football stadium; and 165 research centers and institutes.

The University of Pennsylvania remains an eminent, world-class institution for the creation and dissemination of knowledge, serving as a model for colleges and universities throughout the world.



GPIC-Related Course Offerings

Environmental Building Design

The Department of Architecture in the School of Design at the University of Pennsylvania is offering an advanced, one-year Master in Environmental Building Design (MEBD) for architects seeking new skills and competitive advantage in the growing field of sustainable design.

With the renewed urgency of environmental issues—from global climate change to resource shortages and “net-zero” design—architects are faced with demands for new kinds of services that require a new kind of professional. LEED accreditation is only a start, helping designers utilize existing technologies, but a wider range of skills is required to achieve real innovation and to meet the needs of clients in this rapidly changing field. New building design, renovation of existing buildings, and environmental analysis at many scales are critical aspects of comprehensive environmental design. The challenge to architects is to operate at scales greater and smaller than that of the building, requiring the understanding of the chemistry of materials as well as consideration of the impact of whole populations of buildings on their local, regional, and global ecosystems.

Ecological Design

The Department of Architecture offers a certificate program in Ecological Architecture that provides an opportunity for students enrolled in the Masters of Architecture or other degree programs to gain expertise in ecological design. The Certificate program also offers practicing professionals the opportunity to pursue specialized training.

The basic goal of the certificate in ecological architecture is to help students develop an understanding of the dynamic interaction between the natural and built environments, and to introduce performance based techniques for operating in that interaction. Ecological design can involve many different kinds and scales of practice, from landscapes to products, and draws on many fields of expertise. In its broadest form it is open, contingent, historical (non-reversible), and organic to its environments.

Energy and Sustainability

The Energy and Sustainability (ENSU) Minor offered by Penn Engineering provides students with a broad coverage of technical and societal issues confronting the world and in-depth treatment of selected topics in technical areas relevant to energy and sustainability.

Construction

Course explores basic principles and concepts of architectural technology and describes the interrelated nature of structure, construction and environmental systems, focusing on light and heavy steel frame construction, concrete construction, light and heavyweight cladding systems and systems building.

Environmental Systems

This course examines the environmental technologies of larger buildings, including heating, ventilating, air conditioning, lighting, and acoustics. Modern buildings are characterized by the use of such complex systems that not only have their own characteristics, but interact dynamically with one another and with the building skin and occupants. Questions about building size, shape, and construction become much more complex with the introduction of sophisticated feedback and control systems that radically alter their environmental behavior and resource consumption. Class meetings are divided between slide lectures, demonstrations, and site visits.

Dimensions of Sustainability

Building is an inherently exploitive act - we take resources from the earth and produce waste and pollution when we construct and operate buildings. As global citizens, we have an ethical responsibility to minimize these negative impacts. As creative professionals, we have a unique ability to go farther than simply being "less bad," We can learn to imagine designs that heal the damage and regenerate our environment. This course explores the evolving approaches to ecological design - from neo-indigenous to eco-tech to LEED to biomimicry to living buildings. Taught by a practicing architect with many years of experience designing green buildings, the course also features guest lecturers from complementary fields - landscape architects, hydrologists, recycling contractors and materials specialists. Coursework includes in-class discussion, short essays and longer research projects.

Building Pathology

This course addresses the subject of building deterioration and intervention, with the emphasis on the technical aspects of deterioration. Construction and reconstruction details and assemblies are analyzed relative to functional and performance characteristics. Case studies cover subsurface conditions, structural systems, wall and roof systems, and interior finishes with attention to performance, deterioration, and stabilization or intervention techniques.

Integrated Building Design

As we push to improve environmental building design performance in areas such as energy and water consumption, carbon emissions, constructability/deconstructability, and occupant productivity, there is growing evidence that an integrative design approach is necessary. This course will focus on two factors that must be learned by the entire design and construction team for successful integrative design: systems thinking and effective collaboration. Students will work with guest lecturers who are architects, engineers, builders and others working at a high level of integration in their own work. The course will be a workshop format with the guests presenting actual design questions and working with students on integrative solutions. The goal is for students to understand how integrative thinking, collaboration and an understanding of the interactions of building systems and context can be used to achieve high levels of building performance.

Contact

Eduardo Glandt

University of Pennsylvania
3451 Walnut Street,
Philadelphia, PA 19104
215 898-5000
www.upenn.edu

Mission Statement

The University's mission is to provide high-quality undergraduate programs in the arts and sciences and fields, with emphasis upon those of special benefit to the citizens of Pennsylvania; offer superior graduate programs in the arts and sciences and the professions that respond to the needs of Pennsylvania, as well as to the broader needs of the nation and the world; engage in research, artistic, and scholarly activities that advance learning through the extension of the frontiers of knowledge and creative endeavor; cooperate with industrial and governmental institutions to transfer knowledge in science, technology, and health care; offer continuing education programs adapted to the personal enrichment, professional upgrading, and career advancement interests and needs of adult Pennsylvanians; and make available to local communities and public agencies the expertise of the University in ways that are consistent with the primary teaching and research functions and contribute to social, intellectual, and economic development in the Commonwealth, the nation, and the world.

Profile

Founded in 1787 as a small, private school, the Pittsburgh Academy was located in a log cabin near Pittsburgh's three rivers. In the more than 220 years since, the University has evolved into an internationally recognized center of learning and research. Private through much of its history, Pitt became a state-related university in 1966. Today, the University of Pittsburgh system comprises the 132-acre Pittsburgh campus and regional campuses in Bradford, Greensburg, Johnstown, and Titusville. The University's 12,000 employees, including 3,800 full-time faculty members, serve about 34,000 students through the programs of 15 undergraduate, graduate, and professional schools.

GPIC-Related Course Offerings

Construction Management

This course introduces undergraduates to the construction management processes including planning, financing, contract administration, and project scheduling and controlling. It is a practical course that provides a broad knowledge of managerial decision-making for young engineers. This is the basic course for all follow-on construction courses.

Life Cycle Assessment Methods and Tools

This course teaches framework, methods, and tools that can be applied to decision making in the design, construction, operation, and maintenance of the build environment, particularly when reducing environmental impact of construction activities is a goal.

Topics include the principles of life cycle assessment, case studies of applications of life cycle assessment, methods for life cycle inventory, and methods for life cycle impact assessment. The course will also include an in-depth critical review of rating systems, methods, and software.

Engineering and Sustainable Development

This course is intended as an introductory interdisciplinary engineering course. Topics include principles of sustainable design in engineering, manufacturing, infrastructure, communications, and community development; overview of environmental issues for engineers; design for the environment; models of environmental processes; introduction to the use of life cycle assessment; and case studies examining the relationship of green design and the field of engineering.

Resource Use and Environmental Quality in Construction

Green Building Construction class that addresses issues of quantifying and estimating mass and energy flows during the life cycle of buildings, including tools and methods for calculation and analysis of the resource (mass and energy) flows in constructing, operating, and maintaining the built environment. The course will include an introduction to sustainability, green materials and processes, calculation of resource flows, and software tools for modeling resource flows.

Solar Design and Fabrication

This is a technical elective course covering residential solar design and fabrication. Students in this course will work on a team to design and construct an off-grid home whose heating, cooling, and lighting systems are primarily solar powered. The course will involve research, design, and hands-on application of innovative building systems. The end product of the team's work in this course is a functional home.

Green Building Design and Construction

Understanding the Design and Construction of green buildings are key elements in green and sustainable engineering. This course teaches all of the major aspects of green building design and construction, including sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, innovation, and design process. The United States green building council's leadership in energy and environmental design green building rating system is used to demonstrate one possible green building rating system. Life cycle thinking will be discussed to expand the focus from not only design and construction, but also use, operations, and decommissioning.

Building Information Modeling

The goal of this course is to introduce the students to building information modeling (BIM) and other new and evolving technologies which are revolutionizing the building and horizontal infrastructure construction industry. Students will learn how BIM and other innovative technologies are being adopted currently by progressive builders to streamline the construction process through enhanced coordination, visualization, logistical planning, cost estimation and analysis. They will also learn how these new tools are enabling (and in some instances requiring) new highly integrated processes that are redefining architecture, engineering, construction and operations (AECO) business relationships and delivery contracts.

Contact

Amir Koubaa

University of Pittsburgh
949 Benedum Hall
Pittsburgh, PA 15261
412-624-9869
www.pitt.edu

VIRGINIA TECH

Mission Statement

Virginia Polytechnic Institute and State University is a public land-grant university serving the Commonwealth of Virginia, the nation, and the world community. The discovery and dissemination of new knowledge are central to its mission. Through its focus on teaching and learning, research and discovery, and outreach and engagement, the university creates, conveys, and applies knowledge to expand personal growth and opportunity, advance social and community development, foster economic competitiveness, and improve the quality of life.

Profile

Dedicated to its motto, *Ut Prosim* (That I May Serve), Virginia Tech takes a hands-on, engaging approach to education, preparing scholars to be leaders in their fields and communities. As the commonwealth's most comprehensive university and its leading research institution, Virginia Tech offers 215 undergraduate and graduate degree programs to more than 30,000 students and manages a research portfolio of nearly \$400 million. The university fulfills its land-grant mission of transforming knowledge to practice through technological leadership and by fueling economic growth and job creation locally, regionally, and across Virginia.



GPIC-Related Course Offerings

Bachelor of Science in Building Construction

Accredited by the American Council for Construction Education, this program combines the technical and managerial aspects of the construction industry. The required courses focus on construction, technical competency, and business. Students are also involved in team mentoring and leadership exercises. Upon completion of the four-year, 134-credit-hour curriculum, students receive a bachelor of science in building construction.

The program offers two track options where students take classes in structural, mechanical/electrical systems, engineering design, construction means, methods, building materials, real estate, and land development. Required courses also cover topics in estimating and bidding strategies, planning and scheduling, construction procedures, financing, contracts, economics, company operations, and project management.

Construction Management

Graduates are prepared to pursue management, supervisory, and leadership positions in construction, development, homebuilding, and facilities professions. Fundamental elements involved in managing construction projects. Management structure, construction contracts, equipment and labor productivity, scheduling, quality assurance, and cost control.

Designing For Hazard Control in Construction

Design of construction projects and systems to control inherent hazards to the health and safety of construction workers, inhabitants of the built environment, and the general public. The course will provide students with in-depth knowledge of the regulatory and legal drivers pertinent to construction, the chemical and physical health hazards, the major classes of safety hazards, analysis tools, and safety management processes.

Systems Engineering of Construction Processes

The Construction Industry Institute and leaders in the field of Construction Engineering and Management recognize the need to apply systems engineering tools and processes to the construction industry, in order for the industry to remain responsive to challenges in labor and raw material shortages. This course will provide the students with working knowledge of major industrial and system systems engineering concepts and tools, with an application to construction management processes and problems.

Construction Systems Design and Integration

This course will study building systems, their design and how to best manage the life cycle cost of the systems. The course will have particular emphasis on systems. The course will have particular emphasis on mechanical and electrical equipment in buildings, solar design, lighting design, site orientation, value engineering and constructability of the various systems.

Introduction to Green Engineering

This course is designed to introduce engineering students to global environmental issues that engineers must be aware of to be responsible citizens and environmentally conscious engineers. We will examine ways in which human and engineering activities impact the environment and students working in teams will investigate and prepare a term paper on critical environmental issues in their particular engineering discipline.

Energy Efficiency Training for Facility Managers

Most commercial buildings are currently operated at approximately 50% efficiency. Many facility managers have forgotten how to run boilers, HVAC and electrical systems efficiently. Through retraining, re-metering, bill tracking and a little re-thinking, facility managers can avoid costly boiler and HVAC replacements and increase their efficiencies by 25-50%, resulting in \$100k+ savings. This class will interface with and prepare facility managers to use EPA's EnergyStar Portfolio Manager and its Building Rating and Benchmarking tools.

Contact

Richard Benson

Virginia Tech
118 N. Main St.
Blacksburg, VA 24061
540-231-6909
www.vt.edu

Other Education and Training Organizations

ASSOCIATION OF BUILDERS AND CONTRACTORS

Mission Statement

To lead the construction industry, guided by the principles of Merit Construction and Free Enterprise, while promoting the highest level of quality, safety and training.

Profile

Associated Builders and Contractors (ABC) is a national association with 75 chapters representing more than 23,000 merit shop construction and construction-related firms with nearly two million employees.

The Eastern Pennsylvania Chapter of ABC represents more than 400 members throughout the Delaware Valley and is one of the leading chapters in the country. Our members are located in Philadelphia, Bucks, Montgomery, Chester, Delaware, Lehigh, Northampton, Carbon, Monroe, Luzerne, Pike, Wyoming, Lackawanna, Wayne, and Susquehanna Counties. Schuylkill and Berks Counties are shared with the ABC Keystone Chapter.

ABC has been helping merit contractors build their companies for over 50 years. They help their members grow by ensuring that merit contractors can compete freely and openly in the marketplace. ABC offers members a wide variety of services.

GPIC-Related Course Offerings

Construction Technology

This curriculum will ground the trainee in the basic knowledge and principles of carpentry, masonry, concrete finishing, electrical work, HVAC, and plumbing. He or she will become skilled in different phases of a project from start to finish. Once completing this course, the trainee will be able to interpret construction drawings; perform quality concrete and brickwork; frame walls, ceilings, and floors of a structure; and install the proper wiring and piping for electrical, and plumbing systems.

Construction Craft Laborer

This curriculum introduces the trainee to a variety of trades, including carpentry, masonry, ironworking, electrical, welding, heavy equipment, and

cranes. Upon completion of this two-level course the trainee will have the basic knowledge needed on any job site. The Construction Craft Laborer curriculum covers such subjects as Site Layout, Reinforcing Concrete, and Electrical Safety. This module was developed to instruct construction supervisors on sustainable management techniques, especially as they relate to construction-phase LEED points targeted for their projects. A collaborative effort of the Green Building Certification Institute (GBCI), the Myers-Lawson School of Construction at Virginia Tech, the University of Florida, and Subject Matter Experts from the Top 100 Green Contractors in the United States, this module covers a topic not addressed until now—sustainable construction management for front-line supervisors.

This module has been endorsed by GBCI and approved by the US Green Building Council for 20 GBCI general and LEED-specific Continuing Education (CE) Hours for LEED Professionals. The LEED-specific categories for which this course have been approved are: LEED AP Building Design and Construction (BD+C); LEED AP Operations and Maintenance (O+M); and LEED AP Interior Design and Construction (ID+C). This means that those students who already possess a LEED Green Associate or a LEED AP credential may apply these hours towards the mandatory upkeep of their credentials with GBCI. For more information on GBCI's Credentialing Maintenance Program, go to www.gbci.org and select Credential Maintenance.

Green Topics in HVAC

Divided into four modules, this program explores the methods and opportunities for increasing the efficiency of energy use and the quality of air that we breathe. These modules are approved by the USGBC for continuing education hours. They are also LEED specific and together total 40 continuing education hours for Credential Maintenance. This means that those students who already possess a LEED Green Associate or a LEED AP credential may apply these hours towards the mandatory upkeep of their credentials with GBCI. For more information on GBCI's Credentialing Maintenance Program, go to www.gbci.org and select Credential Maintenance.

Weatherization

As energy efficiency is becoming a priority for homeowners across America, many are turning to the weatherization industry to assist in their efforts.

NCCER's new Weatherization program offers training that exceeds the existing standards for weatherization installers, crew chiefs, and building auditors. This program combines existing NCCER curricula with new building science modules that address the specific needs within this industry. Dual credentials are available within this program.

Alternative Energy

Endorsed by the Florida Energy Workforce Consortium in support of the 17th Career Cluster development for Energy, Alternative Energy investigates the viability and value of fossil fuel alternatives, such as biomass/biofuel, nuclear, solar, and wind.

Introduction to Solar Photovoltaics

This training is approved by the US Green Building Council (USGBC) for 15 hours of continuing education under the Green Building Certification Institute's (GBCI) Credentialing Maintenance Program for LEED (Leadership in Energy and Environmental Design). This means that those students who already possess a LEED Green Associate or a LEED AP credential may apply these hours towards the mandatory upkeep of their credentials with GBCI. For more information on GBCI's Credentialing Maintenance Program, go to www.gbci.org and select Credential Maintenance.

Solar Photovoltaic Systems Installer

The United States is now the fourth largest solar photovoltaic market in the world, and all indicators point to continued growth as installation costs decrease and economic incentives rise. As the market continues to grow, the need for trained solar PV technicians to install these systems will intensify. In response to this demand, NCCER has developed a curriculum for both entry level and advanced solar PV installation technicians—all in support of the North American Board of Energy Practitioners' (NABCEP's) educational standards for technicians. The entry-level course will be built in accordance with the NABCEP PV Entry Level Objectives. The comprehensive PV installation course was built to support NABCEP's PV Installer Job Task Analysis. When combined with select modules from NCCER's Electrical program, this training can meet individual state requirements for 4-year apprenticeship programs.

Contact

John Judge

Association of Builders and Contractors
430 W Germantown Pike
East Norriton, PA 19403
610-279-6666
www.abceastpa.org

Mission Statement

Education and Information Resource Center (EIRC) is committed to continuously improving the education, safety, physical and emotional health of children. EIRC meets this commitment by developing and delivering a comprehensive array of support services to those who teach, raise, care for and mentor children. The Center accomplishes its mission while meeting or exceeding the highest standards for client service, product/service value and employee-job satisfaction.

Profile

EIRC is a public agency specializing in education-related programs and services for parents, schools, communities, nonprofit organizations and privately held businesses throughout New Jersey. The programs also reach into more than 36 states and 8 foreign countries.

EIRC offers a great many resources under one roof. These range from gifted and special education services to creative problem solving...from nationally validated programs in science, mathematics and geography to child care and child assault prevention ... from web development, graphics and printing to computer instruction ... and from teacher in-service and curriculum design to international exchange programs.

GPIC-Related Course Offerings

Green School Learning Institute

The Institute brings professionals from the US Green Building Council (USGBC) and other organizations representing areas such as: solar energy, architecture, engineering, flooring, waste management, lighting, landscaping, HVAC, renewable energy and many more that can help guide teachers and schools with solutions for greening buildings, green collar career opportunities and sustainable technologies.

Innovation and Design

In this unit, students will take on the role of LEED Accredited Professionals and other team members needed to design a green building and contribute to a sustainable design. Using what they learned cumulatively in the other units, students will work through the process of LEED. Their design will focus on having the least amount of impact to the environment and to the inhabitants that will occupy the building. This unit can be accomplished as a design challenge or competition. At every level of this curriculum and extension activities much attention will be placed on group work to resemble the charette process which is all the team members working together from the beginning of a project to ensure maximum sustainability. Unit 6 can be integrated at the High School level as well with High School students serving as mentors to Middle School students. Educators will be encouraged to work with University level students, Emerging Green Builders or LEED Accredited Professionals from the USGBC as mentors.

Outcomes for 9th through 12th grade: understand the balance between human actions and the environment. Learn Problem Based Learning methods, a student-centered and teacher-facilitated process. Understand 21st century skills in Science, Technology, Engineering, and Mathematics (STEM) that will support green building and a sustainable future. Investigate the political and societal obstacles for going green

Building Energy Systems

- Energy Performance
- Optimize Energy Performance (New Buildings vs. Existing Buildings)
- Green Power
- Learn about current uses of energy production methods
- Global warming and climate change
- How green buildings can significantly reduce the negative impact on greenhouse gas emissions
- Energy audits
- Energy conservation
- Energy policy
- Capstone energy project

Contact

Carol James

Education and Information Resource Center
107 Gilbreth Parkway
Mullica Hill, NJ 08080
856-582-8282
www.eirc.org



ENERGY COORDINATING AGENCY (ECA)

Mission Statement

The mission of the Energy Coordinating Agency (ECA) is to help people conserve energy and to promote a sustainable and socially equitable energy future for all in the Philadelphia region. ECA is the sole or largest provider of the following services, thus filling a critical role in the region.

Profile

ECA is a non-profit corporation that provides energy counseling and education, energy conservation, heater repair and replacement. ECA coordinates the provision of energy-related services for low-income Philadelphians through a network of 15 Neighborhood Energy Centers (NECs). Consult the website to learn the service area and services provided by each individual NEC. Program applications are to be completed at your local NEC. Qualified counselors at ECA's local Neighborhood Energy Center work with households to analyze their energy problems, assist the family in applying for appropriate services for which they are eligible, and provide basic energy education to help families reduce expenses and avoid shut-off. The counseling is on a first-come first-served basis. Clients are asked to bring along their current energy bills.

GPIC-Related Course Offerings

Baseload Auditing and Customer Service for Crew Chiefs and Auditors

Course Description: This course presents the principles of energy use during off seasons. The student will become familiar with PA WAP Baseload Measures and will learn how to determine and assess Baseload use and opportunities such as lighting efficiency, identify standby loads and how to identify lifestyle causes for high Baseload use. It is specifically designed for Weatherization Crew Chiefs and Auditors to educate WAP clients about their impact on Baseload use. Students will be assessed via instructor observation.

Introduction to Residential Heating

Course Description: This course provides students with an overview of residential heating systems and their efficiencies. Emphasis is on ensuring that PA WAP clients' combustion appliances are operating safely and efficiently before, during and after weatherization installation measures are completed. Students will explore various heating systems including forced air, boilers, baseboard heat, and domestic hot water heaters. Competencies taught are required by the PA Department of Labor and Industry and students are assessed via written and lab evaluations.

Advanced Diagnostic Approaches to Weatherization Systems

Course Description: Detailed study of the causes of house pressure imbalances as a function of the interacting relationship of the house shell and its mechanical systems. Students will understand the importance of aligning the thermal and pressure envelope in a house. Students will be trained on how to perform a worst case chimney and combustion appliance zone test, zonal pressure and pressure pan test. Competencies taught are required by the PA Department of Labor and Industry and students are assessed via written and lab evaluations.

Building Performance Institute (BPI): Residential Building Envelope Whole House Air Leakage Control Installer

Course Description: Students learn to implement measures to tighten the building envelope to reduce energy loss from air leakage and reduce pollutants and allergens through air migration. Improve thermal comfort and energy efficiency through the proper installation of dense-pack insulation materials. Course is approved by BPI and meets competencies required for National Certification upon completion of written and field evaluation.

Home Energy Auditing

Course Description: Students become familiar with the role that quality plays in all aspects of PA WAP measures from principles of building science, the diagnostics approaches to weatherization to combustion science. The Auditor is considered to be the first line of defense in assisting the client to conserve energy and must be proficient in blower door guided air leakage testing, heat systems testing and analysis, materials estimation, a field data collection form. Students will be assessed by Instructor observation of lab exercises.

Department of Energy (DOE) Lead Safe Work Practices

Course Length: 2 days Course Description: This course defines an overview of safety, health, applicable state and local regulations, regarding potential hazards that can arise when weatherization measures may disturb homes built prior to 1978, that may contain lead-based paint and its harmful effects, especially to children. Students perform proper weatherization interior and exterior setup and/or cleanup, designed to contain the spread of lead dust. Competencies taught are set by Department of Energy and required by the PA Department of Labor and Industry and are assessed via written evaluations.

Environmental Protection Agency (EPA) Lead Safety RRP

Course Description: Designed to teach compliance with Renovation, Repair and Painting (RR&P) rule in Section 402(c) (3) of the Toxics Substance Control Act (TSCA). Taught are safety measures necessary to protect inhabitants during renovation, repair and painting projects in pre-1978 housing and in pre-1978 child-occupied facilities, such as daycare centers, where lead-based paint will be disturbed by the work. Students will be assessed via written evaluation to receive National certification.

Contact

Walt Yakabosky

Energy Coordinating Agency
1924 Arch Street
Philadelphia, PA 19103
215-988-0929
www.ecasavesenergy.org

ENGINEERS' CLUB OF GREATER PHILADELPHIA

Mission Statement

The Engineers' Club of Philadelphia is dedicated to the advancement of the engineering field including its various disciplines, the professional development of its members, and networking among technical professionals.

Profile

The Engineers' Club is offering courses which meet the needs of many practicing technical professionals. In today's rapidly changing world, it is mandatory that engineers not only maintain, but continually increase both technical and management skills to remain on the cutting edge. One very effective and enjoyable way to accomplish this goal is the educational program offered by the Engineers' Club. The Club's Educational Program uses a variety of instructional methods to make the educational experience both enjoyable and highly effective. Some of the courses are eligible for professional development hours (pdh). A certificate of completion will be provided to those completing the course. All courses have been or will be submitted to the New Jersey State Registration Board. Some courses have been approved in the past and we anticipate the others will be as well.

GPIC-Related Course Offerings

Construction Building Codes

The course will familiarize the student with the content of the International Code Council's 2009 International Building Code®, the purpose and intent of code requirements and how to apply the code to structures and occupancies. The course will primarily cover the non-structural provisions in depth (with a structural and materials overview), concentrating on Chapters 1 through 12, which are those most often in need of interpretation. The building code is the keystone to the entire family of fourteen International Codes in that it provides the occupancy classifications, types of construction, building elements and terminology referenced by all of the codes. (25 pdh)

Photovoltaic Systems Installation

This course is designed to provide students with the knowledge and skills necessary to install photovoltaic systems supplying electric power to residential and commercial buildings. The course's objective is to prepare students for entry level positions working with photovoltaic systems in roles such as installers, designers, and or estimators. It will also prepare them for other entry level positions requiring basic electrical wiring skills. While the course's major focus is photovoltaic systems, basic electrical theory and the National Electrical Code, as it pertains to photovoltaic systems, will be introduced.

Other areas of training include common wiring methods and the bid process. Safe working practices when working with electricity will be covered throughout this course. This is an ETA-approved class and satisfies the requirements for students to take the test for Photovoltaic Installer Certification. (16 pdh)

Mechanics of Heating and Ventilation

This ten session course consists of an introduction or review of heat, heat measurement, material specific heat, ambient/design conditions and code requirements. Also building heat loss, hydronic (hot water heating) systems, air quality building ventilation, hot air heating systems and industrial ventilation methods design will be studied in detail. Heating and ventilation equipment and applications will be investigated. Students, in addition to quizzes and homework, will prepare a heating and ventilation project for a small medical office building. (20 pdh)

Contact

Susan Best

Engineers' Club of Greater Philadelphia
215 South 16th Street
Suite 16
Philadelphia, PA 19102
215-985-5701
www.engrclub.org

SMART ENERGY INITIATIVE OF SOUTHEASTERN PENNSYLVANIA (SEI)

Mission Statement

The Smart Energy Initiative (SEI) of Southeastern PA is a public-private partnership whose mission is to promote the growth of the “smart” energy industry by providing comprehensive business and workforce development services in the region.

Profile

The Smart Energy Initiative is a regional, public-private energy industry partnership sponsored by the Chester County Economic Development Council. Key collaborators include: PennFuture, Workforce Investment Boards of Chester, Bucks, Delaware, Montgomery, and Philadelphia counties, Southeastern PA energy industry representatives, Ben Franklin Technologies, the Delaware Valley Industrial Resource Center, and area colleges/universities/technical schools. The program is designed to facilitate the expansion/growth of the clean and renewable energy sector in Southeastern PA (SEPA). The Chester County Economic Development Council created the Chester County International Business Council (CCIBC) to contribute to the vitality of the regional economy by directly assisting businesses in international commerce. CCIBC is directed by its 33 member Advisory Board composed of executives with international expertise from industry and service sectors. Additionally, the Advisory Board provides mentoring, counseling and strategic input to local companies doing business internationally.

GPIC-Related Course Offerings

Entry-Level Solar PV Design and Installation

This 40-hour course provides an overview of basic solar photovoltaic (PV) system applications according to the curriculum set forth by NABCEP, primarily focusing on grid-tied 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 grid-tied system, wire sizing, overcurrent protection, grounding, battery backup, local, state and federal financial incentives, economic analysis and ROI calculations. Infinite Solar has furnished a 25'x25' mock roof for indoor, hands-on instruction during the third and fourth days of this five-day class.

Solar Technical Sales and Financing

2 day training with an optional half-day Solar Fundamentals Course

Solar Sales and Finance is designed for contractors and others within a company who are involved in selling solar PV systems. Topics include PV markets and applications, customer qualification, site analysis, system design parameters, system components, cost estimation, energy production modeling, use of financial analysis tools, as well as general advice and tips for closing.

Follow-up Training and Best Practices for DEP Approved Solar PV Providers

This six hour long workshop is specifically for DEP listed solar PV contractors who have or are currently installing PV systems under the Sunshine Program. It will cover NEC code-compliant issues and performance/design issues with regard to preliminary site assessment, permits, interconnection, 2008 NEC grounding and bonding, and system inspections.

The course will cover the common violations they often find or have observed at site visits or during inspections; rules and strategies for working with inspectors; review various parts of the NEC (including calculation exercises), and go over best practices for installing PV systems.

Contact

Will Williams

Smart Energy Initiative of Southeastern Pennsylvania
737 Constitution Drive
Exton, PA 19341
610-458-5700
www.smartenergypa.org

SUSTAINABLE BUSINESS NETWORK

Mission Statement

The mission of the Sustainable Business Network is to build a just, green, and thriving economy in the Greater Philadelphia region. We accomplish this by educating and growing a broad base of local, independent businesses and educating policymakers and the public.

Profile

SBN's Business Education programs include green business seminars and workshops, expert panels, peer-to-peer mentoring and opportunities to connect with other leaders in the local business community. Along with these monthly events, SBN also hosts the Social Venture Institute, an annual two-day conference that teaches entrepreneurs how to run a successful business that has a positive social and environmental impact. SBN uses local catering whenever possible and prints most event materials on recycled, FSC certified paper. Their venues are at central locations that are usually close to public transportation, have on-site recycling and, whenever possible, composting for food waste. They pride themselves on hosting events that minimize our carbon footprint.

GPIC-Related Course Offerings, Initiatives, Resources and Partnerships

Social Venture Institute

(SVI) is a two-day training conference that teaches entrepreneurs how to run successful businesses that have a positive social and environmental impact. In addition to learning from seasoned entrepreneurs and unique business case studies, participants receive concrete, practical feedback in the areas of finance, marketing and management. Participants also have the chance to learn about local resources, meet mentors and make important business and personal connections with other attendees. The content, while relevant and useful to any entrepreneur, has a focus on integrating personal values and a commitment to the community, employees and the environment into business practices.

Business Education

SBN offers access to educational programming on a variety of topics and issues that have relevance to the local living economy. SBN's Business Education programs include green business seminars and workshops, expert panels, peer-to-peer mentoring and opportunities to connect with other leaders in the local business community. Along with these monthly events, SBN also hosts the Social Venture Institute, an annual two-day conference that teaches entrepreneurs how to run a successful business that has a positive social and environmental impact.

Business United for Conservation

Business United for Conservation (BUC) is an Industry Partnership of companies that provide conservation and pollution mitigation services in the Philadelphia region. Together BUC businesses identify and address barriers to industry growth, workforce needs, business-to-business procurement opportunities, industry best practices, and technology trends. Broadly, environmental conservation and pollution mitigation includes: reducing greenhouse gas emissions, waste and pollution, and conserving water and other natural resources.

BUC is also committed to facilitating the ongoing alignment of local green companies with job training service providers, building a talent pipeline through the public workforce system, optimizing public investments to best serve the workforce needs of regional businesses, and securing employment commitments and advancement opportunities for qualified workers. Further, BUC serves as a green business advisory group to inform future workforce, policy, and economic development agendas around environmental conservation and curriculum development in emerging industries.

Green Economy Task Force

SBN and the Green Economy Task Force released the fourth chapter of the Emerging Industries Project, “Gray to Green: Jumpstarting Private Investment in Green Stormwater Infrastructure” in March 2010. One of Gray to Green’s recommendations was to establish an industry partnership to ensure that emerging companies have easy access to resources and a strong network to address barriers and advance the industry. In response, Business United for Conservation Industry Partnership (BUC) was formed.

Green Economy Toolkit

Are you building a green jobs movement in your community? SBN wants to share best practices and lessons-learned from the Green Economy Task Force with you and your allies. The Green Economy ToolKit is packed with research, resources, and templates to get you started. [Click here to view a preview of the Green Economy ToolKit.](#) For just \$100 you will receive the 145-page ToolKit by mail and a one-hour consultation with Kate Houstoun, SBN’s Director of Sustainable Business Services.

Emerging Industries Report

The Emerging Industries Project is our methodology for collecting data directly from regional businesses, building productive relationships between job trainers and employers, and informing our collective work to grow the green economy. Like the Green Economy Task Force itself, the Emerging Industries Project is informed and driven by four essential elements of a

robust and equitable green economy: policy, funding, job training, and employer commitment. Each industry was selected based both on its potential to provide quality employment to people with barriers to employment and its potential for significant growth in our region. The process for each chapter includes a public meeting or forum; targeted interviews; business/employer roundtables; site visits; working groups; and a final policy paper or industry report. Each chapter aims to give Stakeholders of the Green Economy Task Force a foundation from which to develop industry-focused strategies for the road ahead.

Green Training Index

Are you looking to give yourself or your company a competitive advantage? Explore the Green Training Index and learn about more than sixty green training and education programs in Southeastern Pennsylvania. The Green Training Index showcases the greener side of some traditional training institutions and makes it easier for citizens to find courses at regional colleges and academic institutions. Members of the Sustainable Business Network can access full profiles for any of the training programs. There is no cost to list or update a training program profile.

B-lab Survey

SBN is partnered with B Lab to offer members an opportunity to measure and benchmark their social and environmental performance using the B Ratings System. The B Ratings System is a comprehensive, user-friendly, online survey which evaluates your company's impact on all stakeholders (Employees, Community, Environment, Consumers, and Governance).

Contact

Leanne Krueger-Braneky

Sustainable Business Network
1617 JFK Boulevard
Philadelphia, PA 19103
215-922-7400
www.sbnphiladelphia.org

Emerging Standards & Certifications

BUILDING PERFORMANCE INSTITUTE

Profile

BPI is a national standards development organization for residential energy efficiency and weatherization retrofit work. As an independent, not-for-profit organization, we bring together leading building science experts from across North America to develop our standards using a consensus-based methodology. Taking a holistic view, we ensure that all styles and ages of dwelling are included, and all climate zones are covered.

BPI makes an ongoing effort to grow the building performance industry by developing essential industry standards to enable quality and consistency by ensuring the entire home performance and weatherization workforce is following the same strict protocols – in every city and town, across each county, throughout each state and across the nation. BPI functions as a vital connection between companies, contractors and affiliates to develop a unified technology roadmap and tackles any impasses along the way.

Individuals that have been trained, tested and certified to BPI's nationally recognized standards use the house-as-a-system approach to improving the performance of existing homes – an approach proven to reduce home owner annual utility bills by as much as 20% or more. That's why BPI standards or equivalent are cited by the Home Performance with ENERGY STAR® program from the Department of Energy (DOE) and the Environmental Protection Agency (EPA), as well as several state Weatherization Assistance Programs.

BPI makes an ongoing effort to grow the building performance industry by developing essential industry standards to enable quality and consistency by ensuring the entire home performance and weatherization workforce is following the same strict protocols – in every city and town, across each county, throughout each state and across the nation.

BPI Standards:

- Building Analyst – go beyond a traditional energy audit to perform comprehensive, whole-home assessments, identify problems at the root cause and prescribe and prioritize solutions based on building science.
- Envelope – quantify performance and prescribe improvements to help tighten the building envelope (shell), stop uncontrolled air leakage and optimize comfort, durability and HV/AC performance.
- Residential Building Envelope Whole House Air Leakage Control Installer – implement measures to tighten the building envelope to reduce energy loss from air leakage and also reduce pollutants and allergens through air migration. Improve thermal comfort and energy efficiency through the proper installation of dense-pack insulation materials.

- Manufactured Housing – apply house-as-a-system fundamentals to the specific needs particular to the various types of housing technologies.
- Heating – optimize the performance of heating equipment to help save energy and ensure occupant comfort, health and safety.
- Air Conditioning and Heat Pump – understand the role of these systems within the whole home and how to diagnose and correct problems properly to achieve peak performance.
- Multifamily – apply building-as-a-system fundamentals to diagnose problems and improve the performance of larger, more complex residential structures

BPI Consulting Services

BPI is a recognized leader in the promotion of energy efficiency and clean building technology. BPI provides consulting services in this sector through assistance with standards and policy development, outreach and communications, and program management. BPI is accredited by the American National Standards Institute (ANSI) as a Standards Development Organization.

BPI has provided consulting services for the U.S. Department of Housing and Urban Development, U.S. Environmental Protection Agency, National Renewable Energy Laboratory, New York State Energy Research and Development Authority, and Energy Foundation.

Quality Control

As an ANSI accredited organization and a leader in setting quality standards for the residential efficiency industry, BPI is expert in assuring high quality services. BPI has an established record of completing contracts for consulting services meeting project standards for quality and timeliness. BPI works with federal project and contract managers to track and update implementation from project initiation through completion.

Contact

Larry Zarker, CEO

Building Performance Institute
107 Hermes Road, Suite 110
Malta, New York 12020
877-274-1274 or 518-899-2727
www.bpi.org/schedules.aspx

ENERGY EFFICIENCY & RENEWABLE ENERGY

COMMERCIAL BUILDING INITIATIVE

The Commercial Building Initiative is a government research program sponsored by the U.S. Department of Energy (DOE) that focuses on improving the energy efficiency of commercial buildings in the United States. Here you will learn more about the initiative, research areas, and audience.

Launched in August 2008, the Commercial Building Initiative (CBI) is the umbrella initiative that will guide and coordinate public and private partnerships to advance the development and market adoption of dramatic energy efficiency improvements in new and existing buildings. CBI works with researchers at DOE national laboratories, as well as with public and private partners, to develop technologies and strategies to improve building efficiency.

The Commercial Building Initiative aims to significantly improve the energy efficiency of new and existing commercial buildings. To achieve this goal, CBI researches technologies, strategies, and tools to improve energy savings over current building codes. CBI also engages commercial building owners and operators to ensure these technologies are market-ready.

Whole Building Design for Commercial Buildings

Use of daylighting in a retail environment substantially reduces the electric lighting load, minimizes the cooling loads, and requires smaller cooling systems. This type of integrated design is necessary to achieve maximum energy savings. Whole building commercial design considers all components and subsystems throughout the life of each project and is the most important step in achieving energy-efficient buildings. The Commercial Building Initiative conducts its research using a whole building design approach. Whole building design takes into consideration site, energy, materials, indoor air quality, acoustics, and natural resources. The design team must be fully integrated early in the process, during the Scoping and Predesign phase, to address how these elements work together. The team should include architects, engineers, building occupants and owners, and specialists in areas such as indoor air quality, materials, and energy use.

Architects, engineers, and project teams can make design decisions that reduce the financial impact of energy-saving technologies. For example, siting a building to maximize daylighting reduces the cost of lighting for the lifetime of the building. In addition, optimizing building envelope design will reduce heating and cooling costs. Savings from these design strategies can then be invested in higher quality windows or controls, which will also reduce energy use.

Commercial Building Partnership (CBP)

The Commercial Building Partnerships (CBP) program is accelerating the transformation of the country's energy landscape by demonstrating innovative low-energy technologies and strategies in commercial buildings. CBP, a public/private, cost-shared program sponsored by the U.S. Department of Energy (DOE), pairs selected commercial building owners and operators with

representatives of DOE, its national laboratories, and private-sector technical experts. These teams explore energy saving measures—including some that might otherwise be considered too expensive or technologically challenging—and apply them to specific commercial building projects.

CBP sets the bar high: New construction is designed to consume at least 50 percent less energy than ANSI/ASHRAE/IES Standard 90.1-2004, and retrofits are designed to consume at least 30 percent less energy than either Standard 90.1-2004 or current consumption.

Commercial Buildings Consortium

The Commercial Buildings Consortium is a partnership of commercial building professionals and industry stakeholders that supports the U.S. Department of Energy (DOE) in achieving the goals of the Commercial Building Initiative. The more than 300 organizations in the Consortium provide DOE access to their members' technical expertise, communicate the emergence of new technologies to the commercial building community, and promote the demonstration of high-performance building technologies.

The National Association of State Energy Officials (NASEO) was selected by DOE as convener of the Consortium. NASEO is the only national nonprofit organization consisting of governor-designated energy officials from each state and territory and has the collective expertise to move the market toward high energy efficiency in five target markets: commercial real estate, retail, hospitals, higher education, and state and municipal governments. A steering committee made up of NASEO members and lighting, window, and heating, ventilation, and air conditioning suppliers will outline and drive the Consortium's goals and objectives.

The following building areas are represented in the Consortium:

- The design professions, including national associations of architects and of professional engineers
- The development, construction, financial, and real estate industries
- Building owners and operators from the public and private sectors
- Academic and research organizations with extensive commercial building energy expertise
- Building code agencies and organizations, including a model energy code-setting organization
- Independent high-performance green building associations or councils
- Experts in indoor air quality and environmental factors
- Experts in intelligent buildings and integrated building information systems
- Utility energy efficiency programs
- Manufacturers and providers of equipment and techniques used in high-performance green buildings
- Public transportation industry experts
- Non-governmental energy efficiency organizations

Job/Task Analysis (JTA) is a systematic procedure for determining what tasks are performed in a specific occupation. These tasks are then analyzed to determine the knowledge, skills, and abilities required to perform them. Groups of 6-12 public- and private-sector industry practitioners collaborated to develop each of the JTAs below; a list of these workshop participants may be found at the back of each document. To learn more about how these industry practitioners were selected, please see the project approach page.

Commercial Building Energy Auditor

A Commercial Building Energy Auditor is an energy solutions professional who assesses facility systems, observes site conditions, analyzes and evaluates equipment and energy usage, and recommends strategies to reduce energy, water, and associated costs to help clients meet established goals.

Commissioning/Retro-Commissioning Authority

A Commissioning/Retro-Commissioning Authority manages the development and implementation of a documented quality assurance process to verify that new or existing buildings function according to the owner's requirements.

Commercial Building Energy Modeler

A Commercial Building Energy Modeler constructs engineering and economic models to represent the performance of buildings, in order to evaluate and quantify the impact of policy, design, retrofit, and operational decisions.

Energy/Sustainability Manager

An Energy/Sustainability Manager monitors energy and material consumption in facilities by performing site audits and conducting energy and sustainability analyses, to identify opportunities to increase building efficiencies, promote renewable resources, and minimize the social, environmental, and financial impacts of an organization's operation.

Facility Manager

A Facility Manager is a building maintenance specialist and property administrator who conducts building operations and maintenance activities, coordinates facility programs and projects, and supervises building personnel by inspecting the facility, analyzing building data, forecasting future needs, solving problems, and communicating with others to ensure the efficient and sustainable operations of the facility and the satisfaction of the facility occupants.

Operating Engineer/Building Technician

An Operating Engineer/Building Technician is a professional who manages commercial and laboratory buildings by maintaining, operating, and repairing HVAC, life safety, electrical, and plumbing systems, and performing general building maintenance to optimize equipment performance, maintain the building's operability, and ensure the comfort and safety of occupants.

For more information:

http://www1.eere.energy.gov/buildings/commercial_initiative/workforce_task.html#authority

NATIONAL RENEWABLE ENERGY LABORATORY (NREL)

NREL is the only federal laboratory dedicated to the research, development, commercialization and deployment of renewable energy and energy efficiency technologies. Backed by 34 years of achievement, NREL leads the way in helping meet the growing demand for clean energy.

NREL's mission and strategy are focused on advancing the U.S. Department of Energy's and our nation's energy goals. The laboratory's scientists and researchers support critical market objectives to accelerate research from scientific innovations to market-viable alternative energy solutions. At the core of this strategic direction are NREL's research and technology development competencies. These areas span from understanding renewable resources for energy, to the conversion of these resources to renewable electricity and fuels, and ultimately to the use of renewable electricity and fuels in homes, commercial buildings, and vehicles.

Analysis at NREL aims to increase the understanding of the current and future interactions and roles of energy policies, markets, resources, technologies, environmental impacts, and infrastructure. These analyses are used to inform decisions as energy-efficient and renewable energy technologies advance from concept to commercial application.

Building Design

Buildings are universal and shelter virtually every aspect of our lives—we work, live, learn, govern, heal, worship, and play in buildings. As a result, buildings have a significant impact on energy use and the environment. According to the U.S. Energy Information Agency, homes and commercial buildings use 71% of the electricity in the United States and this number will rise to 75% by 2025. Opportunities abound for reducing the enormous amount of energy consumed by buildings. NREL is at the forefront in developing advanced building technology and science to reduce the amount of energy consumed in our nation's buildings—our goal is to significantly improve the energy efficiency of buildings and to accelerate the use of renewable energy technologies within the next decade.

NREL is a nationally recognized leader in buildings research combining renewable energy with innovative technologies to significantly reduce energy consumption in buildings. Our award-winning staff and facilities have received many awards.

Commercial Building Partnerships

Commercial Building Partnerships is a U.S. Department of Energy (DOE) sponsored collaborative research project involving retailers, commercial real estate management companies, and a distribution facility provider. The National Renewable Energy Laboratory (NREL) and the Pacific Northwest National Laboratory (PNNL) support this project by assisting the Commercial Building Partners as they work to reduce the energy use of their facilities. Here you will learn more about NREL's role in Commercial Building Partnerships (CBP) and about the companies participating.

This project is part of DOE's Net-Zero Energy Commercial Building Initiative. The purpose of CBP is to design and deploy easily replicable, energy-efficient, cost-effective commercial building designs for both new and existing buildings. NREL is working directly with private companies that have committed to meet certain levels of energy efficiency.

Commercial Building Partnerships Process

Here you will find a description of the key stages in the Commercial Building Partnerships process. The National Renewable Energy Laboratory (NREL) works directly with companies participating in Commercial Building Partnerships to help them with the process. The process comprises four stages that take about five years to complete. Following is a brief overview of each stage.

Stage One: Pre-Design Planning

NREL will provide integrated design expertise, benchmark existing building energy use, analyze building portfolios, and determine the best energy efficiency strategies for each operating climate. The objective is to find an energy efficient solution that meets the company's business needs, constraints, and objectives.

Stage Two: Design

NREL and the companies' design teams will develop detailed energy and cost analyses to ensure that the proposed designs meet both the energy savings targets and the cost and other business requirements identified by the companies.

State Three: Performance Verification

During the construction process, NREL and the companies will ensure that the energy efficiency measures are installed and functioning correctly. When the building is operating as designed, NREL will measure its energy consumption to determine how its performance compares with the target energy goals.

Stage Four: Reporting

NREL will prepare case studies, a detailed research report, and a document for each company describing the business case for making energy efficiency improvements to their buildings. The reports will be shared with participating Commercial Building Partners.

Training

NREL provides training and instruction that helps governments, businesses, tribes, and other organizations build capacity to implement clean energy technology deployment projects successfully.

NREL supports the U.S. Department of Energy (DOE) in providing instruction in the use of energy efficiency and renewable energy assessment tools. For example, we assist with DOE's Federal Energy Management courses on renewable energy project implementation, low-energy sustainable laboratory design, project financing, energy savings performance contracts, and utility energy services contracts.

We participate in hands-on training modules that incorporate the following NREL resources:

- Tools that Inform Building Energy Efficiency Strategies
- NREL offers a suite of tools and protocols designed to develop energy-efficient design strategies for buildings and electric infrastructure. These tools analyze energy conservation measures, incorporating life-cycle costing equations to calculate simple payback, discounted payback, net present value, and savings-to-investment ratios for each.
- Op-tE-Plus Software for Commercial Building Optimization
- The Advanced Commercial Buildings Research group at the National Renewable Energy Laboratory (NREL) develops and utilizes advanced energy modeling tools to help architects, engineers, and facility managers understand the energy implications of their designs and maximize the efficiency of their buildings. Whole-building energy modeling and optimization are important tools for achieving energy-efficient, cost-effective buildings. To maximize the energy-savings potential of a building, NREL researchers use Opt-E-Plus, a powerful tool that automatically runs thousands of simulations and identifies design options that provide the most economical energy savings.

The NREL researcher, based on input from the project team, defines parameters of the building in Opt-E-Plus. Here, a building model created using OpenStudio, which can be imported into Opt-E-Plus, provides the starting point. The list shows some of the 40 parameters used. By selecting PV from the list, the NREL researcher can specify the type of PV used and modify cost data. Opt-E-Plus automatically runs a large number of energy simulations—3,000 per building on average—and then provides a set of optimal building features and characteristics that can help meet the design goals for the building.

For more information:

http://www.nrel.gov/buildings/comm_building_design.html

AMERICAN SOCIETY OF HEATING REFRIGERATION AIR-CONDITIONING ENGINEERS CERTIFICATIONS

Profile

American Society of Heating Refrigeration Air-Conditioning Engineers (ASHRAE), founded in 1894, is an international organization of 51,000 persons. ASHRAE fulfills its mission of advancing heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education. ASHRAE was formed by the merger of two societies, American Society of Heating and Ventilating Engineers (ASHVE), known after 1954 as American Society of Heating and Air-Conditioning Engineers (ASHAE) and the American Society of Refrigerating Engineers (ASRE). The two merged in 1959.

ASHRAE writes standards and guidelines in its fields of expertise to guide industry in the delivery of goods and services to the public. ASHRAE standards and guidelines include uniform methods of testing for rating purposes, describe recommended practices in designing and installing equipment and provide other information to guide the industry. ASHRAE has some 87 active standards and guideline project committees, addressing such broad areas as indoor air quality, thermal comfort, energy conservation in buildings, reducing refrigerant emissions, and the designation and safety classification of refrigerants.

ASHRAE develops standards for both its members and others professionally concerned with refrigeration processes and the design and maintenance of indoor environments. ASHRAE writes standards for the purpose of establishing consensus for: 1) methods of test for use in commerce and 2) performance criteria for use as facilitators with which to guide the industry. ASHRAE publishes the following three types of voluntary consensus standards: Method of Measurement or Test, Standard Design and Standard Practice. ASHRAE does not write rating standards unless a suitable rating standard will not otherwise be available.

Consensus standards are developed and published to define minimum values or acceptable performance, whereas other documents, such as design guides, may be developed and published to encourage enhanced performance.

ASHRAE is accredited by the American National Standards Institute (ANSI) and follows ANSI's requirements for due process and standards development.

In order to provide a basic introduction to the varied and complex issues associated with building energy codes, the U.S. Department of Energy's (DOE's) Building Energy Codes Program (BECP), with valued assistance from the International Codes Council (ICC) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), has prepared Building Energy Codes 101: An Introduction. This guide is designed to speak to a broad audience with an interest in building energy efficiency, including state energy officials, architects, engineers, designers, and members of the public.

Building Energy Code Development

Building energy codes are minimum requirements for energy efficient design and construction for new and renovated residential and commercial buildings. A component of a complete set of building regulations that govern all aspects of the design and construction of buildings, building energy codes set an energy-efficiency baseline for the building envelope, systems, and equipment. Improving these minimum requirements or broadening the scope of energy codes softens the environmental impact of buildings as well as generates additional energy and cost savings over the decades-long, or even centuries-long, life cycle of a building.

Baseline Codes: IECC and ASHRAE 90.1

Two primary baseline building energy codes may be adopted by states and local jurisdictions to regulate the design and construction of new buildings: the International Energy Conservation Code® (IECC), and the ANSI/ASHRAE/IESNA Standard 90.1 Energy Standard for Buildings except Low-Rise Residential Buildings. The IECC addresses all residential and commercial buildings. ASHRAE 90.1 covers commercial buildings, defined as buildings other than single-family dwellings and multi-family buildings three stories or less above grade. The IECC adopted, by reference, ASHRAE 90.1; that is, compliance with ASHRAE 90.1 qualifies as compliance with IECC for commercial buildings.

Standard Benchmark Energy Utilization Index

The U.S. Department of Energy (DOE) and several of its national laboratories have developed a series of benchmark models based on 16 different commercial building types (prototypical standard buildings). Commercial building models are available for both new construction as well as existing buildings. The existing building models are separated into pre-1980 construction and post-1980 construction.

These benchmarks are not intended to represent the existing stock of commercial buildings in any geographic area or climate zone. They are not intended to be targets to rate the energy performance of single existing or proposed buildings. The primary purpose of these benchmarks is to establish a quantitative definition of Standard 90.1 at a particular time in its development and to provide a reference from which future versions of the same standard are compared. These model files (version 1.2-4.0, updated October 31, 2009) comply with Standard 90.1-2004. These benchmark buildings provide consistency in modeling approaches and implementation across the commercial building sector.

Certifications

ASHRAE's certification programs are developed by industry practitioners who understand the knowledge and experience that are expected for superior building design and system operation. Earning an ASHRAE certification assures employers and clients that the certificant has mastered the body of knowledge associated with the respective field. An ASHRAE certification also serves as a springboard for continued professional development

Building Energy Assessment Professional Certification

ASHRAE has developed the Building Energy Assessment Professional (BEAP) certification program in collaboration with representatives from ASHRAE's Building Energy Quotient (bEQ) program, IESNA, NIBS, SMACNA, and TABB. The purpose of this program is to certify individuals' ability to audit and analyze residential, commercial, and industrial buildings including determining project scope, collecting data, analyzing building performance, interpreting results, evaluating alternatives, submitting recommendations for energy conservation measures, and assisting with the implementation of these recommendations.

Building Energy Modeling Professional

ASHRAE's Building Energy Modeling Professional certification program was developed in collaboration with the U.S. affiliate of the International Building Performance Simulation Association (IBPSA-USA) and the Illuminating Engineering Society of North America (IESNA). The purpose of this program is to certify individuals' ability to evaluate, choose, use, calibrate, and interpret the results of energy modeling software when applied to building and systems energy performance and economics and to certify individuals' competence to model new and existing buildings and systems with their full range of physics.

Commissioning Process Management Professional Certification

ASHRAE has developed the Commissioning Process Management Professional (CPMP) program in close collaboration with APPA, BCA, IES, NEBB, SMACNA, TABB, and the University of Wisconsin - Madison. To continue to improve building performance, experts agree that the commissioning process should be implemented in new and existing buildings – and the correct management of that process is critical. The purpose of this certification is to help building owners, developers, standards writing agencies, and others assess the capability of individuals to manage the whole building commissioning process. The Commissioning Process Manager oversees and coordinates the commissioning process and communicates on behalf of the building owner with the commissioning provider and the commissioning team. For some projects, the commissioning provider may perform the function of the commissioning process manager, but for other projects, another individual performs these functions.

High Performance Building Design Professional

ASHRAE has developed the HBDP program in close collaboration with the Illuminating Engineering Society of North America (IESNA) and the Mechanical Contractors Association of America (MCAA) and with input from the U.S. Green Building Council (USGBC) and the Green Building Initiative (GBI). Candidates who earn the HBDP certification will have demonstrated a well-rounded understanding and knowledge of how HVAC&R design is integrated into high performing buildings to achieve the overall goal of producing a sustainable HVAC&R design.

Operations and Performance Management Professional

ASHRAE has developed the Operations & Performance Management Professional (OPMP) program in close collaboration with APPA and GSA. Candidates who earn the OPMP certification will have demonstrated a well-rounded understanding and knowledge of the management of facility operations and maintenance and their impact on HVAC&R systems' performance.

Healthcare Facility Design Professional

ASHRAE has developed the Healthcare Facility Design Professional (HFDP) certification program in close collaboration with the American Society for Healthcare Engineering (ASHE) of the American Hospital Association. Candidates who earn the HFDP certification have demonstrated a well-rounded understanding and knowledge of medical terminology and facility operations as they affect HVAC&R design in healthcare facilities.

The Value of ASHRAE Certification

ASHRAE's certification programs are developed by industry practitioners who understand the knowledge and experience that are expected for superior building design and system operation. The programs support and are supported by the ASHRAE Learning Institute, thereby providing a complete learning process. ASHRAE enjoys a worldwide reputation for being the leader in HVAC&R design and our certification programs serve to reinforce that reputation, which ASHRAE has worked hard to earn and maintain over the past 100+ years.

To Employers:

An ASHRAE certification lets employers know that the certification earner has mastered a significant body of knowledge in a specific aspect of HVAC&R design, as determined by industry professionals in that field, and has met specified eligibility requirements. This knowledge will serve as the springboard for a certification earner's continued professional development in the HVAC&R and building industry.

To Building Owners:

A firm that employs ASHRAE certification earners has demonstrated a corporate commitment to the professional development of its employees and a dedication to providing the best possible resources for building design projects.

To Certification Earners:

An ASHRAE certification broadens your knowledge base. It also allows you to stand out from the crowd and may improve your options for being hired, promoted, and/or tapped for working on certain types of design projects.



To Society:

More knowledgeable engineers can design better HVAC&R systems for the betterment of society as a whole, for current generations and for generations to come. Earning an ASHRAE certification indicates mastery of a given body of knowledge, as determined by subject matter experts in that field. ASHRAE encourages its members and other individuals who pass through its certification program to use the knowledge gained to improve the world around us.

Contact

ASHRAE

1791 Tullie Circle, N.E.

Atlanta, GA 30329

Toll-free for Customer Service: (800) 527-4723 (U.S. and Canada only)

Phone: (404) 636-8400

Fax: (404) 321-5478

ashrae@ashrae.org

Summary of Reports

SIZING THE CLEAN ECONOMY — A NATIONAL AND REGIONAL GREEN JOBS ASSESSMENT

Sizing the Clean Economy Report – Brookings

The Brookings Institution is a nonprofit public policy organization based in Washington, DC. Our mission is to conduct high-quality, independent research and, based on that research, to provide innovative, practical recommendations that advance three broad goals:

- Strengthen American democracy;
- Foster the economic and social welfare, security and opportunity of all Americans and
- Secure a more open, safe, prosperous and cooperative international system.

The research agenda and recommendations of Brookings’s experts are rooted in open-minded inquiry and our scholars represent diverse points of view. More than 200 resident and non-resident fellows research issues; write books, papers, articles and opinion pieces; testify before congressional committees and participate in dozens of public events each year. The Institution’s president, Strobe Talbott, is responsible for setting policies that maintain Brookings’s reputation for quality, independence and impact.

Summary

The clean economy has remained elusive in part because, in the absence of standard definitions and data, strikingly little is known about its nature, size, and growth at the critical regional level.

Currently no comprehensive national database exists on the spatial geography of the clean economy and its sub industries, although important work has assessed the clean economy across states. And while numerous studies have analyzed individual regional clean or green industries, a proliferation of definitions and the absence of data for large numbers of regions have made it difficult to situate regional clean economies in a national and comparative context.

The result: Debates about the so-called “green” economy and “green jobs” have frequently been short on facts and long on speculation, assertion, and partisanship. Which gets to the impetus of this report: Seeking to address some of these problems, the Metropolitan Policy Program at Brookings worked with Battelle’s Technology Partnership Practice to develop, analyze, and comment on a detailed database of establishment-level employment statistics pertaining to a sensibly defined assemblage of clean economy industries in the United States and its metropolitan areas.

”Sizing the Clean Economy: A National and Regional Green Jobs Assessment“ concludes that:

- The clean economy, which employs some 2.7 million workers, encompasses a significant number of jobs in establishments spread across a diverse group of industries.
- The clean economy grew more slowly in aggregate than the national economy between 2003 and 2010, but newer “cleantech” segments produced explosive job gains and the clean economy outperformed the nation during the recession.
- The clean economy is manufacturing and export intensive. Roughly 26 percent of all clean economy jobs lie in manufacturing establishments, compared to just 9 percent in the broader economy.
- The clean economy offers more opportunities and better pay for low- and middle-skilled workers than the national economy as a whole.
- Among regions, the South has the largest number of clean economy jobs though the West has the largest share relative to its population.
- Most of the country’s clean economy jobs and recent growth concentrate within the largest metropolitan areas.
- The clean economy permeates all of the nation’s metropolitan areas, but it manifests itself in varied configurations.

Sizing the Clean Economy — A National and Regional Green Jobs Assessment, July 2011

The Brookings Institution Metropolitan Policy Program

<http://www.brookings.edu/metro.aspx>

Green Jobs: Survey of the Energy Industry AEE

The Association of Energy Engineers (AEE), founded in 1977, is a nonprofit professional society of over 15,000 members in 84 countries. The mission of AEE is “to promote the scientific and educational interests of those engaged in the energy industry and to foster action for Sustainable Development.” AEE offers a full array of informational outreach programs including seminars (live and internet based), conferences, journals, books, and certification programs.

AEE’s network of 72 local chapters meets regularly to discuss regional issues. AEE’s roster of Corporate Members is a veritable “who’s who” from the commercial, industrial, institutional, governmental, energy services, and utility sectors.

Survey Results (Non- detailed analysis - only statistical results)

The Association of Energy Engineers (AEE) issued a survey to its members to determine the need for Green Jobs, Energy Industry Potential, Stimulus Results and Salary Data. The results represented are based on 1,934 responses and are outlined in this report.

- Forty-one percent (41%) of the energy professionals who were surveyed plan to retire in the next ten years.
- Thirty-two percent (32%) of energy professional’s surveyed plan to retire in the next ten years.
- Seventy-two percent (72%) of energy professionals indicate a heightened shortage of qualified professionals in the energy efficiency and renewable energy fields in the next five years.
- Seventy percent (70%) of energy professionals indicate a need for national and state training for “Green Jobs” to address job shortages that are impairing growth in green industries, such as energy efficient buildings and construction, renewables, electric power, smart grid, energy efficient vehicles and biofuels development.

Green Jobs: 2011 Survey of the Energy Industry (Relevant Trends, Opportunities, Projections & Resources),

Association of Energy Engineers, 2011.

<http://www.aeecenter.org>

CALIFORNIA WORKFORCE EDUCATION & TRAINING NEEDS ASSESSMENT FOR ENERGY EFFICIENCY, DISTRIBUTED GENERATION, AND DEMAND RESPONSE

UC Berkeley

Founded in the wake of the gold rush by leaders of the newly established 31st state, the University of California's flagship campus at Berkeley has become one of the preeminent universities in the world. Its early guiding lights, charged with providing education (both "practical" and "classical") for the state's people, gradually established a distinguished faculty (with 21 Nobel laureates to date), a stellar research library, and more than 350 academic programs.

Summary

This report presents the results of the California Workforce Education and Training Needs Assessment for Energy Efficiency, Demand Response, and Distributed Generation (WE&T Needs Assessment). This project was carried out under joint management by the California Public Utilities Commission (CPUC) and the investor-owned utilities (IOUs) of California with Southern California Edison (SCE) serving as the lead utility for the IOUs.¹ The project was funded by the ratepayers of California under the auspices of the CPUC.

Workforce Development Infrastructure

The research on California's workforce development infrastructure comprises an assessment of California's education and job training programs at all educational and career levels that are relevant to the energy efficiency and related sectors. It includes both an inventory of education and job training programs in key occupations related to energy efficiency and a random sample survey of programs in the inventory, looking at the following institutions:

- Four-year universities
- Community colleges
- Certified apprenticeship programs
- Private industry training programs
- Community-based organization training programs
- Regional Occupational Centers and Programs
- Utility training programs

It also includes an analysis of K-12 programs in the energy efficiency sectors and an analysis of employment information systems (online job matching systems). The emphasis of the analysis is on the key roles that each institution plays and how they fit together, including an assessment of the various planning arenas and mechanisms in the state to link economic development and workforce development and coordinate workforce development efforts.

To address strategies supporting the full participation of minority, low-income and disadvantaged communities, the Needs Assessment includes:

- A separate chapter focused on identifying best practices for workforce education and training programs and other interventions and policies.
- Again, the researchers do not assume that training and education is the only avenue that is needed to improve opportunities for disadvantaged workers, but also look at policies and programs that intervene in the demand side of the labor market to affect the kind of jobs created and who is hired.
- Although initially asked to focus on overcoming barriers to entry into training programs, the research team found that a more important consideration is overcoming barriers to placement in good jobs—not just in training programs—that may or may not lead to good jobs.
- Consideration of the issues facing disadvantaged workers is integrated throughout the report, as well as separately addressed in the report.

California Workforce Education & Training Needs Assessment for Energy Efficiency, Distributed Generation, and Demand Response.

Institute for Research on Labor and Employment, University of California, Berkeley, 2011

www.irlle.berkeley.edu/vial/publications/WE&T_Part1.pdf

PENNSYLVANIA GREEN JOBS REPORT

PA Green Jobs Report

In 2007, the Pew Charitable Trusts ranked Pennsylvania third among the states with the highest number of clean energy jobs. While a fine achievement, Pennsylvania is just beginning to actualize the state's green jobs potential. To this end, Pennsylvania is investing in industries and technologies that will create new jobs and transform old ones. Improving access to education and training in emerging industries and occupations for the workforce, and cultivating partnerships among employers in industries with green potential is the overarching goal. By doing so, Pennsylvania is making progress toward accomplishing a three-fold goal of more green jobs, a stronger economy and a healthier planet.

Summary

The Pennsylvania Green Jobs Report explores the green economy and green jobs in relation to Pennsylvania's workforce and economic development efforts. The Pennsylvania Green Jobs Report – Part I begins by assessing the current status of green jobs in the commonwealth and looking at the projected growth of those jobs as a result of state and federal policies and investments.

The report explores green occupations in Pennsylvania, including: new occupations currently in creation, emerging occupations that are projected to grow, evolving occupations that will require new skills and traditional occupations.

Finally, the report outlines the framework for Pennsylvania's green training priorities and identifies the next steps necessary to enhance its labor market infrastructure, identify the needs of employers and gather information on the emerging green economy moving forward.

Energy Efficiency

- Includes efforts to reduce energy consumption in existing buildings and in industrial processes.
- It also includes efforts to improve new buildings' efficiency, to reduce energy lost in distributing electricity and to cultivate demand management (reducing the "peak demand"), because there's a higher possibility of pollution when the system is strained.
- Sample employers include civil engineering consultants and building construction contractors

Renewable Energy

- Includes the two new industries most commonly thought of as green: wind and solar power. This sector also includes geothermal energy and hydroelectric power.
- Sample employers include wind turbine builders and electric utility companies



Clean Transportation

- Includes public transit (rail, subways and others) and vehicle manufacturing (cars, planes and parts), increasing portions of which will use fuels other than fossil fuels, or use them more efficiently.
- Sample employers include aircraft manufacturers and transportation management companies

Pollution Prevention & Environmental Cleanup

- Includes efforts to restore polluted land and rivers to health, and clean industrial processes that lower toxins during production. Maintenance of water and sewer infrastructure to reduce pollution and eliminating contaminants from water are also in this category.
- Sample employers include scientific research facilities and water treatment plant builders

Agriculture & Resource Conservation

- Includes production of renewable fuels (wood, other crops), effective management of natural resources, and practices such as conservation tillage, sustainable and organic agriculture that maintains or enhances soil quality and minimizes inputs.
- Sample employers include corn farms and energy consulting companies.

Pennsylvania Green Jobs Report

The Pennsylvania Department of Labor and the Center for Workforce Information and Analysis January, 2010

GREENER SKILLS - HOW CREDENTIALS CREATE VALUE IN THE CLEAN ENERGY ECONOMY

The Center on Wisconsin Strategy (COWS) has deep roots in the state of Wisconsin, but its work has now grown to address issues, organizations, and leaders across the nation. COWS is more than a traditional policy center. It's an action center, a think-and-do tank. COWS and its affiliate organizations serve as field laboratories for high-road economic development - a competitive market economy of shared prosperity, environmental sustainability, and capable democratic government.

Summary

Green jobs and the skills necessary to do them continue to attract intense attention in this country and elsewhere, fueled by global climate change and job market collapse. The attention is important, but uncoordinated investment in greening the American workforce threatens to create more chaos in an already cluttered U.S. training system. This paper assesses the state of “green” training (a tumult of often inconsistent credentials and competencies across industries, employers, and providers); offers our normative argument for doing better; and provides specific policy suggestions on implementing a national credentialing system and ensuring equitable access to it.

This report is not an inventory but...

- It does not attempt to catalogue the fast emerging and rapidly evolving field(s) of “green.” Even as it delineates prominent national credentials in selected clean energy sectors, its purpose is larger: to suggest a rational framework for human capital development in a greening economy, and to make the case for a national policy of portable, transparent, consistent, industry-specific credentials (and the state-supported pathways up to them).
- Building an equitable, low-carbon economy — one with opportunities for workers at all levels to prosper and advance — poses serious challenges of demand and access.
- On demand, there is no denying the current crisis in employment. But neither is there denying a longer-term increase in demand for skilled labor.
- This will be driven by aging of the current workforce; by belated national attention to our deficits in energy, transportation, and “social” infrastructure; and by new work required by transition to a “new” (cleaner and more efficient) energy economy.
- The larger questions of access (who gets training, skills advancement, and decent jobs) and competitiveness (how will U.S. high-road firms get the skilled labor force necessary to build a prosperous green future) can be answered most effectively and equitably by wholesale reform of training systems and the labor markets they supply.

- In the green context, the development and certification of standardized competencies can nudge energy efficiency and renewable energy industries onto the high road by guaranteeing both quality jobs and quality work. The former is essential to realizing the equity promise of the new energy economy, the latter critical to demonstrating and capturing the benefits of green technologies.
- One way to get at job quality is to define, and where possible require, a certified workforce, which can command better wages in the labor market. The additional advantage — and critical value-added, really — of a certified labor force is that it offers some guarantee on quality of work.

Conclusion

Beyond skills training, green jobs initiatives must address access and upward mobility. To help workers advance from unemployment, disconnection, or dead-end, poverty-wage work into better, greener jobs, policy-makers at every level should work with local partners to develop career pathways — and bridges onto them. For low-skilled, low-wage, unemployed, or disconnected workers to access the skills training necessary to land decent jobs, they need clear, consistent on-ramps into the system, and where they exist, its career pathways.

Finally, improving the nation's dismal post-secondary persistence rates for low-skill adults, most of whom never complete a certificate, diploma, or degree, requires the strategic overhaul of (a) financial aid systems and (b) program delivery to sustain workers who attend college part time. All of which can and should be supported by federal, state, and local institutional policy.

Greener Skills - How Credentials Create Value in the Clean Energy Economy
Center on Wisconsin Strategy, University of Wisconsin, Madison 2010

A GREEN CAREER PATHWAYS FRAMEWORK: POSTSECONDARY AND EMPLOYMENT SUCCESS FOR LOW-INCOME, DISCONNECTED YOUTH.

The Corps Network

Established in 1985, The Corps Network is the voice of the nation's 158 Service and Conservation Corps. Currently operating in 46 states and the District of Columbia, Corps employs 33,300 young men and women annually and generates approximately 265,000 community volunteers who in partnership with Corps members provide 15.3 million hours of service to their communities and the environment.

Today's Service and Conservation Corps provide a wealth of conservation, infrastructure improvement, and human service projects—those identified by communities as important. Some Corps improve and preserve our public lands and national parks. Others provide critical energy conservation services, including weatherization, restore natural habitats and create urban parks and gardens. Still others provide disaster preparation and recovery to under-resourced communities. Finally, Corps raise the quality of life in low-income communities by renovating deteriorating housing and providing support to in-school and after school education programs.

Summary

This paper explores the extent to which this emerging green economy can offer a pathway out of poverty for low-income young people, many of whom have disengaged from school and are struggling to find a way into the economic mainstream. These disconnected youth — some six million strong — represent an untapped resource. Despite the fact that they have experienced difficulties in their personal lives or communities and may not have completed high school, many seek a second chance, returning to programs such as Service and Conservation Corps or other education and work initiatives in their local communities.

One of the most promising developments of the past several years is the emergence of a green economy. With environmental awareness growing across this country:

- Green skills are being added to existing occupations (in fields such as energy and engineering) and new jobs that are primarily “green” are rapidly emerging.
- Green jobs — jobs that contribute to meeting the goal of achieving environmental sustainability — encompass a broad range of occupations and skill sets, from technical expertise in building, retrofitting, conservation, or planning, to business functions that support the work such as sales, customer service, or accounting.
- Some green jobs are new; others represent the retooling of existing occupations. Jobs range from entry level positions to those requiring advanced credentials, but most are “middle-skill,” requiring more than a high school degree but less than a four-year college education.



- The green jobs sector of the economy is expanding, showing considerable growth and long-term employment potential despite the recession. National groups and lead states such as Michigan and Washington have documented the growth of jobs in this relatively new sector.
- Green jobs also show potential to offer workers a living wage. Employers are working with partners to establish credentials for green jobs and define career pathways that will ensure an adequate and skilled labor force that can keep pace with future demand.
- A collective hope is that the “greening” of the economy will lead to greater environmental sustainability and to the economic revitalization of communities, as well as impel development of new or retooled occupations and new career pathways that offer avenues to prosperity for workforce entrants and under skilled youth and adults.

Pathways Out of Poverty

The final section of the paper highlights the importance of active partnerships between community-based youth programs and postsecondary institutions in building on-ramp programming to green jobs. The paper outlines a number of strategies for forging these partnerships successfully.

In conclusion, the paper raises the question of how this work could go to scale, offering some brief suggestions on how the policy and advocacy and employer communities might help impel these partnered efforts towards more powerful results for young people, for businesses and for the health and well-being of communities.

A Green Career Pathways Framework: Postsecondary and Employment Success for Low-Income, Disconnected Youth.

The Corps Network, June, 2011

ENERGY EFFICIENCY SERVICES SECTOR: WORKFORCE EDUCATION AND TRAINING NEEDS, LBNL 2010

2006 marked the 75th anniversary of the founding of the Lawrence Berkeley National Laboratory, also known as Berkeley Lab. Located on a 200 acre site in the hills above the University of California's Berkeley campus, Berkeley Lab holds the distinction of being the oldest of the U.S. Department of Energy's National Laboratories. It is managed by the University of California.

The Lab's legacy began in the summer of 1928, when a 27-year-old physics professor named Ernest O. Lawrence was wooed from his faculty position at Yale University to a job at the University of California's Berkeley campus. While at Berkeley, Lawrence invented a unique particle accelerator called a cyclotron which would prove his hypothesis: whirling charged particles around to boost their energies, then casting them toward a target is an effective way to smash open atomic nuclei. The cyclotron would go on to win Lawrence the 1939 Nobel Prize in physics and usher in a new era in the study of subatomic particles. Berkeley Lab continues the tradition of multidisciplinary scientific teams working together to solve global problems in human health, technology, energy, and the environment.

Summary

This report provides a baseline assessment of the current state of energy efficiency-related education and training programs and analyzes training and education needs to support expected growth in the energy efficiency services workforce. In the last year, there has been a significant increase in funding for "green job" training and workforce development (including energy efficiency), through the American Recovery and Reinvestment Act (ARRA). Key segments of the energy efficiency services sector (EESS) have experienced significant growth during the past several years, and this growth is projected to continue and accelerate over the next decade. In assessing energy efficiency workforce education and training needs, the focus will be on energy efficiency services-related jobs that are required to improve the efficiency of residential and nonresidential buildings.

Energy Efficiency Education and Training Resources

Energy efficiency training and education is provided through professional trade associations and unions for building and construction contractors and trades, utility ratepayer-funded energy efficiency programs, third-party and trade association programs, community and technical colleges, universities, and third-party certificate and accreditation programs. Buildings and construction contractors and tradespeople typically receive initial training in their field (e.g., electrician, HVAC contractor) through union apprenticeship training programs, technical schools or community colleges. Representatives of trade unions report that thousands of apprentices and journeymen take these classes each year, including through technical and community colleges.

These programs also provide continuing education for professional development or licensure. Union and industry association interviewees report that energy efficiency is included in many training programs. Third-party and trade association programs provide an array of energy efficiency-specific professional development and certification courses. A number of organizations, including the Association of Energy Engineers (AEE), the Building Performance Institute (BPI), RESNET and WAP offer energy efficiency-related certification programs and exams.

The Association of Energy Services Professionals (AESP) provides training targeted specifically for professionals supporting energy efficiency program planning, implementation, and evaluation. Enrollment in AESP training programs is projected to increase from ~350 in 2008 to between 1,000 and 2,000 in 2010. BPI certified about 300 people in 2005; certifications are expected to approach 12,000 by 2011-2012. Contacts at RESNET and BPI expressed some concern that rapid program expansion could lead to reduced quality of training; both organizations are establishing guidelines for recruitment of effective trainers. Administrators of large-scale, ratepayer-funded energy efficiency programs often promote education and training initiatives that involve collaboration with community and technical colleges, trade associations and professional organizations, and the development of training centers.

Collaboration also includes acting as affiliates to offer certificates from organizations such as BPI or RESNET. Ratepayer-funded energy efficiency education/training programs supplement community college offerings, including training for building analysts, building envelope engineering and HVAC.

EESS Workforce Education and Training Needs

Community and technical college programs that focus on energy efficiency typically include training for energy managers, HVAC technicians, energy auditors and raters, and building performance analysts.

Energy Efficiency Services Sector: Workforce Education and Training Needs, LBNL 2010

Produced by: Lawrence Berkley National Labs- a division of the Department of Energy, March 2010

Appendices

About the Survey

During 2011 the DVIRC conducted in-person interviews and surveys with individuals representing 27 institutions and organizations in the region. The following information provides an aggregate profile of those institutions and organizations.

Profile of Respondents (Total of 27 respondents and interviews)

- 7 are businesses that work in economic development
- 20 are in the education industry
- 41 total institutions and organizations profiled

- 6 had 1-5 years of experience with their organizations
- 3 had 5-10 years of experience with their organizations
- 8 had 10 years or more of experience with their organizations

- 16 organizations list businesses as their customers
- 9 organizations list K-12 teachers as their customers
- 12 organizations list college students as their customers
- 14 organization list Pre K-12 students as their customers

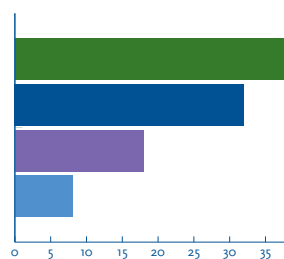
Some of the titles of the respondents include:

- Executive Director
- Dean of Workforce Development
- High School Principal
- Assistant Vice President of Continuing Education
- Administrative Director
- Dean of Technical Education

Some of the organizations offer the following certifications:

- Building Performance Institute® (BPI)
- Building Energy Analyst
- Lead Safe Work Practices
- Masonry
- Electricity
- Environmental Protection Agency (EPA)
- Certified Lead Renovator
- HVAC
- National Sustainability Advisory
- Certified Renovator in Lead Safety
- Residential Advisory Academy
- Carpentry
- Electricity
- PA Department of Energy Lead Safety
- Lead Safety

How would you describe your organization?



Please check all that apply:

- 40% higher education
- 32% secondary education
- 18% community-based organizations
- 8% described themselves as economic development

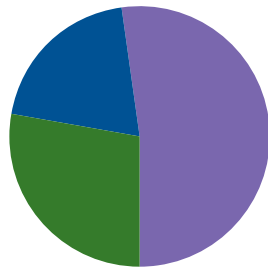
How would you describe the sectors your company/organization serves?



Please check all that apply:

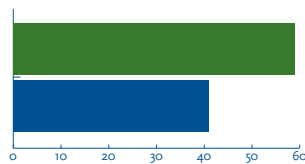
- 73% Businesses
- 55% College Students
- 64% High School Teachers
- 64% Pre K-12 students
- 32% Education Administrators
- 50% Women and girls
- 50% Out of School Youth

How many years have you worked at this organization?



25% 1-5 years
18% 5-10 years
47% 10 years or more

Please indicate how your program connects to other educational programs, either through 2+2+2 articulations or dual enrollments, etc.



59% 2+2+2 articulation agreement of some sort with other programs.
41% Some type of dual enrollment program.

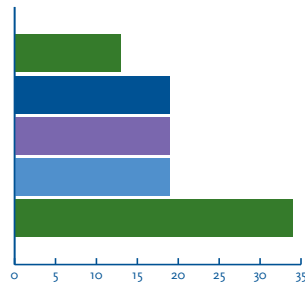
Note: many of the respondents have both types of programs.

Are there any future programming plans?

Key phrases:

Alternative and Renewable Energy Systems
PV Installation
Thermal Solar Design
Green School Programs
Green Technology Training
Solar and Wind Technology
Green Construction
Solar Certificates
Energy Auditing
Weatherization Training
HVAC
Green Energy Camps
Solar-Wind-Bio-fuels Energy
Certifications by Building Performance Institute (BPI) and North American Board of Certified Energy Practitioners (NABCEP)

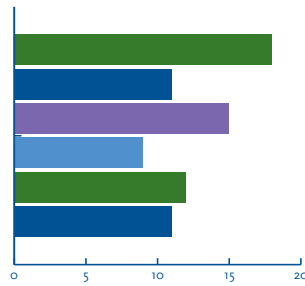
Please indicate ways in which you educate or inform the community about your program or services.



Please check all that apply.

- 13% use direct mail
- 19% use public events
- 19% use social media
- 19 % use their websites
- 34% use some form of advertising

Please indicate ways in which you deliver programs or services to the community.



Please check all that apply.

- 18 use customized training
- 11 use community-based organizations
- 15 use Pre K-12 schools
- 9 use higher education
- 12 use public events
- 11 use some form of e-learning

Energy Career Cluster Map

A grouping of occupations and broad industries based on commonalities is presented below. The Career Cluster Map shows where energy occupations are found in the cluster framework.

