



Building a Trained Workforce:

MERCER COUNTY COMMUNITY COLLEGE

Dominick Defino and Garry Perryman



Solar/Energy Technology Certificate of Proficiency

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 PV installation applications.





Certificate Curriculum

Code	Course	(lecture/lab hours)	Credits
EET 130	Fundamentals of Electronics	(2/2)	3
ENG 101	English Composition I	(3/0)	3
IST 101	Computer Concepts with Applications	(2/2)	3
MAT 110	Elementary Technical Mathematics	(3/0) ₁	3
ARC 134	Building Construction Systems	(3/0)	3
EET 140	Electronic Construction	(1/3)	2
UTI 111	Alternative Energy Sources	(3/0)	3
UTI 112	Energy Auditing and Weatherization	(2/2)	3
UTI 113	Solar Installation Technology	(2/2)	3
— —	Technical elective ₂		3
CMN 123	Job Success: The Search, Resume and Interview	(2/0)	1

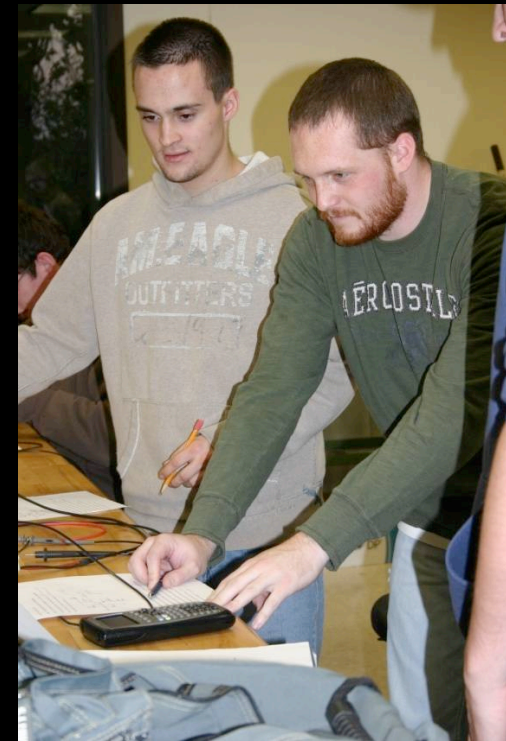
1 Or higher-level mathematics course.

2 Select from HRA 101; UTI 102 or 103; or other course by coordinator approval.



Solar/Energy Technology Certificate of Proficiency

- Fundamentals of Electronics
- English Composition I
- Computer Concepts with Applications
- Elementary Technical Mathematics
- Alternative Energy Sources
- Building Construction Systems
- Electronic Construction
- Energy Auditing and Weatherization
- Solar Installation Technology
- — — Technical elective
- Job Success: The Search, Resume and Interview



UTI 111 - Alternative Energy Sources

An introduction to electrical energy generation and its impact on the environment and society. Various energy alternatives such as solar, wind, geothermal, ocean and fuel cells are examined, along with the positive and negative aspects of each. *3 lecture hours*

Course Competencies/Goals: *The student will be able to:*

- Describe current trends in electrical energy production.
- Describe the need for alternative sources of energy.
- Demonstrate, through written examples, an understanding of the history of the energy generation industry.
- Demonstrate ability to use the internet to research current alternatives to fossil fuels.
- Work with one or more team members to create a report detailing the impact of fossil fuels on the environment and society.
- Demonstrate an understanding of why it is important for energy companies to focus on “going green”
- Use the internet to define job opportunities in the industries related to alternative energy sources.

UTI112 Energy Audit and Weatherization

•UTI112 Energy Audit and Weatherization 3

An introduction to the analysis of energy use in building; tools needed to conduct an energy audit and the basic principles of insulation and weatherization. Topics include: heat transfer through the building envelope; applicable codes and regulations for residential / light commercial building systems.

•To introduce the basic principles of energy (what is energy, how does energy transform, heat flow, thermal comfort, converting energy for building uses)

•To acquire a working knowledge of the energy auditing process.

•To familiarize students with necessary assessment tools, energy audit software and procedural concepts regarding energy auditing.

•To solve basic heating and cooling load problems, including solving R-Value and quantifying overall building thermal performance using UA Delta-T method.

•Develop a written energy audit report estimating energy use given local climate criteria, thermostat setting, roof overhang, and solar orientation, in a given time period and the impact of suggested improvements per year.

•To familiarize students with process of assessing available tax credits from local and central governments for qualifying customers and use of Saving-to-Investment Ratio formula.

•Hours: 2/2 lecture/Lab (60 hours total)

• **Building Analyst Certification**

• This is the introductory certification and is the first step to becoming a professional energy auditor. CleanEdison's course covers the following topics designed to prepare you for the 2 hour 100 question written exam and the 2 hour one-on-one field exam:

• Principles of Energy and Building Science

• The Energy Audit Process

• Building Shell and Thermal Envelope

• Airflow Basics

• Moisture Management

• Air Quality

• Combustion Safety and CO Monitoring

• Building Systems: HVAC, Lighting, Appliances, and DHW

• Diagnosing Common Building Problems

• Blower Door Testing

• Combustion Testing and Safety

• **The course includes:** 13 hrs in class + 8 hrs in the field training + BPI Building Analyst written Exam + BPI Building Analyst one-on-one Field Exam

UTI113 Solar PV installation Learning Objectives

UTI113 Solar installation Technology 3

Introduction to the Solar PV industry. Includes system types and efficiencies, solar site evaluation, differences between grid intertie and off-grid systems and associated components. Students use materials and tools used in solar panel installation. Safety on the job is emphasized. 2 lecture/2 laboratory

• Course Competencies/Goals:

- Understand the basic principles of Photovoltaic systems.
 - Work safely with photovoltaic systems
 - Conduct a site assessment for solar PV installation
 - Select an appropriate systems design
 - Adapt the design for mechanical / electrical design
 - Install PV System and components at the site
 - Perform a system checkout and Inspection
 - Maintain and troubleshooting a system
 - Read and interpret plans and specifications
 - Read and interpret codes and standards
 - Use basic mathematics and some trigonometry
- **Hours: 2/2 lecture/Lab (60 hours total)**

Solar PV installation (NAPCEP)
The PV Entry Level Certificate of Knowledge program is based on a set of learning objectives developed by Committee of PV subject matter experts. The Learning Objectives include ten (10) skill sets:

- PV Markets and Applications
- Safety Basics
- Electricity Basics
- Solar Energy Fundamentals
- PV Module Fundamentals
- System Components
- PV System Sizing
- PV System Electrical Design



Solar/Energy Technology A.A.S. degree

Code	Course	(lecture/lab hours)	Credits
EET 130	Fundamentals of Electronics	(2/2)	3
ENG 101	English Composition I	(3/0)	3
ENG 102	English Composition II	(3/0)	3
IST 101	Computer Concepts with Applications	(2/2)	3
PHY 120	Introductory Physics	(3/0)	3
	or		
PHY 111 -	Physical Science Concepts	(3 /0)	
MAT 110	Elementary Technical Mathematics	(3/0) ₁	3
	or higher		
ARC 125	The Built Environment	(3/0)	3
UTI 111	Alternative Energy Sources	(3/0)	3
ARC 134	Building Construction Systems I	(3/0)	3
ARC 136	Building Construction Systems II	(3/0)	3
DRA191	Introduction to Building Information Modeling (BIM)		2
EET 140	Electronic Construction	(1/3)	2
UTI 112	Energy Auditing and Weatherization	(2/2)	3
UTI 113	Solar Installation Technology	(2/2)	3

2 Select from HRA 101; UTI 102 or 103; or other course by coordinator approval.