EASTERN ARIZONA COLLEGE
Passive Solar Design and Application

Course Design

2020-2021

Course Information

Division	Industrial Technology Education
Course Number	TEC 173
Title	Passive Solar Design and Application
Credits	2
Developed by	Melvin Robinson
Lecture/Lab Ratio	1 Lecture/2 Lab

Transfer Status

ASU	NAU	UA
Non Transferable	Pending Evaluation	Non Transferable

Activity Course	No
CIP Code	15.1703
Assessment Mode	Pre/Post Test (25 Questions/25 Points)
Semester Taught	Upon Request
GE Category	None
Separate Lab	No
Awareness Course	No
Intensive Writing Course	No
Diversity and Inclusion Course	No

Prerequisites

None

Educational Value

This course is designed to provide the fundamentals of passive solar technology in building design and remodeling.

Description

This course provides an introduction into the technology and application of passive solar energy as a renewable and energy efficient form of construction. Students will learn the following aspects of passive solar energy providing heating and cooling: types of solar collectors, water system components, space heating systems, site and sizing criteria, installation procedures, operation and maintenance.

Supplies

Notebook with paper, pen, and pencil

Competencies and Performance Standards

1. Outline the history, development, and economics of solar water heating.

What you will learn as you master the competency:

a. Assess the fundamentals solar water heating to warm a building.
b. Examine the costs and life cycling solar water heating.
c. Define common types of solar collecting systems.
d. Describe the various types of water storage, pump, and fluid systems.

Performance Standards

You will demonstrate your competence:

- in-class assignments
- problem sets
- objective exams
- lab demonstrations

Your performance will be successful when:

- learner assesses the fundamentals solar water heating to warm a building
- learner examines the costs and life cycling solar water heating
- learner defines common types of solar collecting systems
- learner describes the various types of water storage, pump, and fluid systems

2. Analyze the systems design in solar water heating systems.

What you will learn as you master the competency:

a. Define indirect and direct solar heating systems.
b. Describe an integral collector storage system.
c. Compare and contrast; thermosiphon, drain-down, closed-loop, and open-loop systems.
d. Define the principals heating swimming pools and spas with solar energy.

Performance Standards

You will demonstrate your competence:

- in-class assignments
- problem sets
- objective exams
- lab demonstration

Your performance will be successful when:

- learner defines indirect and direct solar heating systems
- learner describes an integral collector storage system
- learner compares and contrasts; thermosiphon, drain-down, closed-loop, and open-loop systems
- learner defines the principals heating swimming pools and spas with solar energy

3. Analyze solar space heating systems.

What you will learn as you master the competency:

a. Define indirect and direct solar heating systems.
b. Describe an integral collector storage system.

c. Compare and contrast; thermosiphon, drain-down, closed-loop, and open-loop systems.

d. Define the principals heating swimming pools and spas with solar energy.

Performance Standards

You will demonstrate your competence:

- o in-class assignments
- o problem sets
- o objective exams
- o lab demonstrations

Your performance will be successful when:

- o learner defines indirect and direct solar heating systems
- o learner describes an integral collector storage system
- o learner compares and contrasts; thermosiphon, drain-down, closed-loop, and open-loop systems
- o learner defines the principals heating swimming pools and spas with solar energy

4. Identify all aspects of selecting and installing the proper solar water heating systems.

What you will learn as you master the competency:

a. Define indirect and direct solar heating systems.

b. Describe an integral collector storage system.

c. Compare and contrast; thermosiphon, drain-down, closed-loop, and open-loop systems.

d. Define the principals heating swimming pools and spas with solar energy.

Performance Standards

You will demonstrate your competence:

- o in-class assignments
- o problem sets
- o objective exams
- o lab demonstrations

Your performance will be successful when:

- o learner defines indirect and direct solar heating systems
- o learner describes an integral collector storage system
- o learner compares and contrasts; thermosiphon, drain-down, closed-loop, and open-loop systems
- o learner defines the principals heating swimming pools and spas with solar energy

5. Assess the basics of passive design.

What you will learn as you master the competency:

a. Define indirect and direct solar heating systems.

b. Describe an integral collector storage system.

c. Compare and contrast; thermosiphon, drain-down, closed-loop, and open-loop systems.

d. Define the principals heating swimming pools and spas with solar energy.

Performance Standards

You will demonstrate your competence:

- o in-class assignments
- o problem sets
- o objective exams
- o lab demonstrations

Your performance will be successful when:

- o learner defines indirect and direct solar heating systems
- o learner describes an integral collector storage system
- o learner compares and contrasts; thermosiphon, drain-down, closed-loop, and open-loop systems
- o learner defines the principals heating swimming pools and spas with solar energy

6. Analyze passive solar cooling.

Learning objectives

What you will learn as you master the competency:

a. Define indirect and direct solar heating systems.

b. Describe an integral collector storage system.

c. Compare and contrast; thermosiphon, drain-down, closed-loop, and open-loop systems.

d. Define the principals heating swimming pools and spas with solar energy.

Performance Standards

You will demonstrate your competence:

- o in-class assignments
- o problem sets
- o objective exams
- o lab demonstration

Your performance will be successful when:

- o learner defines indirect and direct solar heating systems
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- o learner defines the principals heating swimming pools and spas with solar energy

Types of Instruction

Classroom instruction

Demonstration

Field-Laboratory investigations and practice

Grading Information

Grading Rationale

Post Test	10%
Lab work and homework	90%

Grading Scale

A	90% - 100%
B	80% - 89%
C	70% - 79%
D	60% - 69%
F	Below 59%