COCONINO COMMUNITY COLLEGE
COURSE OUTLINE

Revised by Ken Myers January 19, 2018
Status: Permanent
Effective Term: Fall 2018

A. Identification:
   1. Subject Area: Construction Technology Management (CTM)
   2. Course Number: CTM 132
   3. Course Title: Solar Water Heating System
   4. Credit Hours: 2
   5. Course Description: This course will describe the basics of heating domestic hot water via the sun. Heat transfer and thermal dynamics principles are presented, studied, and applied. The basic parameters of solar hot water system design and system sizing will be explored. Various solar water heating systems and each component will be described, and their functions presented. Both drain back, and glycol based solar water heater systems diagrams are presented and discussed, with advantages and disadvantages of each system. Flat plate and evacuated tube solar collectors are examined, discussed, and applied. Other system components are also examined, such as heat exchangers, differential controllers, heat pumps, and solar hot water heaters. This course is designed to allow participants assembly of a solar hot water system. One lecture. One Lab. May be taken for S/U credit with Consent of Instructor.

B. Course Goals: Student will learn the basics of elements and components of solar water heating systems including materials, equipment and major components. The students will use knowledge gained to design, install, and maintain various solar water heating systems.

C. Course Outcomes:
   Upon successful completion of this course, students will be able to:
   1. identify the different types of solar hot water heating systems and their components to perform calculations in fundamental sizing, design, and operation of a solar water heating system;
   2. correctly identify, via testing procedures, the various components of a solar water heating system and each of their functions;
   3. differentiate the various freeze protection techniques available for various solar water heater systems;
   4. identify the different types of solar hot water heating systems and the components that make up each system type;
   5. understand the concepts of heat transfer and thermal dynamics as it applies to liquids;
   6. perform calculations in fundamental sizing, design, and operation of a solar water heating system;
   7. correctly identify, via testing procedures, the various components of a solar water heating system and each of their operation and function;
   8. identify differences between the various freeze protection techniques available for various solar water heating systems.

D. Assessment of Course Outcomes will include a variety of quizzes, tests, and hands-on demonstrations.

E. Course Content will include:
   1. basic parameters of solar hot water heating system sizing will be described;
   2. solar hot water heating system components and function;
   3. a variety of solar water heater systems diagrams and designs will be presented and differentiated;

4. basic solar hot water heating system assembly;
5. technical analysis and testing of the components for flat plate and evacuated tube collectors;
6. solar hot water system pumps, differential controllers and heat exchangers will be explored, examined, and reviewed for operation and functionality.