

COCONINO COMMUNITY COLLEGE
COURSE OUTLINE

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September 20, 1999
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March 4, 2004
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A. Identification:

1. Subject Area: Construction Technology Management (CTM)
2. Course Number: 235
3. Course Title: Solar Home Design
4. Credit Hours: 3
5. Course Description: Alternative passive solar building techniques such as adobe, earth brick, rammed earth, sand bag, and earth ship will be presented, along with environmental and aesthetic design considerations. Prerequisite: CTM 120. Three lecture.

B. Course Goals:

Solar Home design is a course that will lead students through the pre-design and design phases of applying passive solar design and building techniques to a residence. Solar orientation, home site evaluation, alternative design approaches will be considered for the architectural integration of passive solar building techniques into the design and construction of houses. These concepts will be integrated with a "Pattern Language" design approach for student design projects.

C. Course Outcomes: Students will:

1. describe and differentiate between the five systems involved in passive solar home design and their performance characteristics;
2. and design and evaluate a minimum of three projects for solar home heating systems with numerical justifications of each solar application and expected performances for the locale. Projects will include indirect gain, direct gain, and attached sun space.

D. Course Outcomes Assessment will include:

1. quizzes;
2. test;
3. and final design project.

E. Course Content will include:

1. background to passive solar building design:
 - a. definition of passive solar;
 - b. advantages & disadvantages of passive solar;
 - c. some passive design building blocks;
 - d. five basic system types: descriptions; advantages & disadvantages;
 - e. glazing configurations for south walls;
 - f. general approach to evaluating costs;
2. basics of solar building design :
 - a. passive design and energy conservation;
 - b. solar position;
 - c. siting;
 - d. length / width / height ratios;
 - e. daylighting;
3. Five Passive Solar Heating Techniques :
 - a. direct Gain: solar gain; thermal mass; movable insulation; examples of direct gain buildings;
 - b. convective loops: trombe walls; thermosiphon air systems;
 - c. thermal storage walls: basic designs; design variations; design characteristics; building integration; costs; thermal performance; economics;
 - d. trombe wall configurations: materials; design; construction and installation; examples of thermal storage walls;
 - e. thermal roof designs: basic system configurations; examples;
4. Attached Sunspaces:

- a. introduction;
- b. design;
- c. controlling heat flows;
- d. reducing heat loss;
- e. ventilation;
- f. thermal storage;
- g. methods of heat transfer from sunspace to building;
- h. examples;
- i. passive solar cooling;
- j. and bread box water heaters.