

# SST 140 Green Building and Design Concepts

## COURSE DESCRIPTION:

Prerequisites: None

Corequisites: None

This course introduces basic concepts associated with energy and resource conservation and “green” building design theory. This course covers both past and present sustainable and restorative design topics, site analysis and building orientation, passive and active solar design elements, water and energy conservation, day lighting, indoor environmental quality, and healthy building design concepts. The course will familiarize students with the Leadership in Energy and Environmental Design (LEED) certification process. Upon completion, students should be able to integrate these topics into relevant architectural technology course, discussions, and career and employment objectives.

Course Hours per Week: Class, 3. Lab, 0. Semester Hours Credit, 3.

## LEARNING OUTCOMES:

Upon completing requirements for this course, the student will be able to:

1. Discuss why sustainable and restorative design practice is important to the architectural and construction related professions.
2. Conceptualize how sun orientation and water flows significantly impact sustainable building design and site orientation.
3. Apply energy and material conservation concepts to their design work.
4. Produce conceptual drawings that demonstrate how building interact with their environment.
5. Select and use reference materials that assist in the sustainable design process.
6. Identify sustainable revitalization and job opportunities that relate to sustainable practices.

## OUTLINE OF INSTRUCTION:

- I. Introduction to Sustainability
  - A. Advocation for sustainable construction.
  - B. Historical inception.
  - C. Future benefits of adoption of sustainable processes.
- II. Historical development
  - A. The approaching end of the Cenozoic Age.
  - B. Ethical considerations of connecting human design to nature.
  - C. Sustainable concepts: net-zero, carbon footprint, water footprint, building footprint.
  - D. Leadership in Energy and Environmental Design (LEED)
- III. Integration of natural systems within the built-environment
  - A. Biomimicry, Life Cycle Assessment.
  - B. Agrarian earth sciences.
  - C. International Earth Charter.

- D. Forces affecting building and their service life.
- IV. Overview of sustainable building design
- A. LEED-based building performance evaluation.
  - B. Site orientation and selection.
  - C. Water flows.
  - D. Sun orientation.
  - E. Passive and active solar design.
  - F. Building thermal envelope concepts.
- V. Site design
- A. Soil retention and erosion control.
  - B. Impervious area calculations.
  - C. Water management.
  - D. Building and site relationship.
- VI. Site analysis
- A. Sun orientation.
  - B. topography.
  - C. Surface water runoff.
  - D. Ground cover and soil erosion.
  - E. Heat island effect.
- VII. Landscaping
- A. Trees and shading.
  - B. Plant selection guidelines.
  - C. Erosion and water retention.
  - D. Heat island effect.
- VIII. Water storage, distribution, and management
- A. Cisterns.
  - B. Rain water control and distribution.
  - C. Alternative technologies.
  - D. Bio-diversification and densification.
  - E. Rain gardens, grey water, and black water.
- IX. Energy and resource conservation
- A. Heating and cooling.
  - B. Water heating.
  - C. Natural air ventilation.
- X. Building material and construction
- A. Cradle-to-cradle concept.
  - B. Thermal mass of buildings and materials.
  - C. Energy transfer characteristics.

- D. Construction waste management.
- E. Recycled materials acquisitions.
- F. Air quality control and mitigation.

XI. Regulatory oversight and performance analysis

- A. Code enforcement concept affecting “green build” design.
- B. Third party energy analysis.
- C. Building performance standards.
- D. Construction-related community needs.

XII. “Green build” opportunities.

- A. Green collar jobs.
- B. Federal government and non-profit programs.
- C. Local retrofitted and adapted use site that address community revitalization projects.
- D. American Institute of Architectural Students (AIAS) opportunities.

**REQUIRED TEXTBOOK AND MATERIAL:**

The textbook and other instructional material will be determined by the instructor.