

Prepared by the Department of Natural Sciences & Life Fitness

Date of Departmental Approval: February 15, 2017

Date approved by Curriculum and Programs: March 1, 2017

Effective: Fall 2017

1. **Course Number:** ENV181  
**Course Title:** Introduction to Green Building
2. **Description:** This course provides a framework for making practical design and construction decisions that are environmentally responsible by focusing on residential design for Cape Cod, including new construction and renovations/additions. Topics include site orientation, building science fundamentals, passive solar design, water and energy efficiency, healthy indoor environments, green materials and resources, and certification programs in the industry. Students learn to prioritize numerous types of green building strategies by examining case studies and field experiences.
3. **Student Learning Outcomes (instructional objectives; intellectual skills):**  
Upon successful completion of this course, students are able to do the following:
  - Describe categories of green building materials and explain why each is considered green.
  - Describe in detail strategies for 'greening' sites.
  - Describe the primary benefits of green building.
  - Detail different 'green building' techniques and the pros and cons of each.
  - Explain principles of building science and how heat, moisture and air influence building performance.
  - Outline strategies for improving the energy-efficiency and green potential of existing buildings.
  - Evaluate a building site for solar gain and natural ventilation.
  - Outline decision-making strategies for sustainable design and green building techniques.
  - Identify careers and certifications in the green building industry.
4. **Credits:** 3 credits
5. **Satisfies General Education Requirement:** No
6. **Prerequisites:** MAT020 (Prealgebra) or MAT025 (Pre-Algebra) and ENL108 (Critical Reading & Thinking) or satisfactory basic skills assessment scores
7. **Semester Offered:** Varies
8. **Suggested General Guidelines for Evaluation:** Students are graded using homework assignments, classroom activities, tests, and a final exam/project.
9. **General Topical Outline:**
  - I. Introduction
    - A. Green Fundamentals
    - B. Overview/benefits/challenges
    - C. House as a System
    - D. Benchmarks: LEED, EnergyStar, modeling software
    - E. Historical context of sustainable design
    - F. Intro to site orientation, microclimate
  - II. Locations and Linkages
    - A. Urban, suburban, desert, tropics, mountain climates
    - B. Public transportation connections
    - C. Site: landscape, hardscape, storm water management
    - D. Sustainable site analysis: solar angles and azimuth, prevailing winds
    - E. Septic considerations: alternative, composting, constructed wetlands
  - III. Building Science
    - A. Laws of Thermodynamics
      1. Heat, Air and Moisture Flows
    - B. Psychrometrics

- C. Applied Building Diagnostics
- IV. Green Consideration of Building Components: Envelope
  - A. Foundations
  - B. Framing
  - C. Windows and Doors
  - D. Roofs
  - E. Insulation
- V. Green Considerations of Building Components: Systems
  - A. Indoor Water Use
  - B. Electrical Systems: Lighting & appliances
  - C. HVAC
- VI. Green Materials Selection Overview
  - A. What makes a material green?
    1. Reused Materials
    2. Recycled Materials
    3. Sustainable Materials
  - B. Embodied Energy Issues
  - C. Construction Recycling
- VII. Indoor Air Quality
  - A. Ventilation issues
  - B. Impact of material selection
- VIII. Renewable Strategies
  - A. System overviews
  - B. Passive Solar Design
- IX. Energy Efficiency
  - A. Design Considerations
    1. Detailing the thermal and air envelope
  - B. Construction Process
  - C. Building commissioning
  - D. Operation and efficient maintenance
- X. Durability Issues
  - A. Detailing for moisture
  - B. Durability Plan
- XI. Existing Buildings
  - A. Opportunities
  - B. Energy Audits
  - C. Weatherization
- XII. Commercial Buildings
  - A. Internal load-dominated vs. Envelope-load dominated
  - B. Daylighting strategies
- XIII. Designing a Green House
  - A. Efficiency in plan: The Not So Big House
  - B. Taking advantage of the site
  - C. Flexible design: planning for expansion, adaptability