

Energy Efficient Building

Series B Course Syllabus

Course #SRB0002

Course Description

This eight hour online video course will bring attention to methods of green building that allow homes to have less impact on the environment, while providing a greater economic benefit to the homeowner. Even as technological innovation creates new construction possibilities, incorporating energy-efficiency into building projects can not only provide a better quality of life, but also protect the environment. A comprehensive approach to resource and energy efficiency is the best method to achieve a resource and energy efficient building. This course will help builders identify important considerations and then apply those principles to a specific project.

This online course is presented in a video format. Students should review the videos, and then answer the chapter quizzes. Learning objectives directly relate to integrated quizzes. Students must answer 70% of the questions correctly in order to move from lesson to lesson, and to receive credit/certification for the course.

COURSE OUTLINE

Chapter 1. Heat Transfer and Thermal Imaging

(Video length 17 minutes)

***Learning Objectives:** 1) Recognize the impact of energy consumption. 2) Understand energy conservation and generation concepts. 3) Identify types of heat transfer. 4) Describe the uses of thermal imaging cameras and blower door equipment.

I. Energy Consumption

- A. Energy
- B. Resources
- C. Building Systems

II. Energy Conservation

- A. Reduced consumption, emissions
- B. Energy Efficiency Standards and Methods

III. Diagnostic Testing

- A. Thermal Imaging
- B. Blower Door Testing

Chapter 2. Advanced Framing Techniques

(Video length 17 minutes)

***Learning Objectives:** 1) What is advanced framing, and what are some of the techniques used? 2) List the uses of insulated headers and energy heel trusses. 3) Understand the benefits of pre-fabricated walls.

I. Advanced Framing Techniques

- A. 2 x 6 studs
- B. Headers
- C. Raised Heel Trusses

II. Raised Heel Trusses

- A. Full height insulation
- B. Cost efficient

- III. Double 2 x 4 Walls
 - A. Thicker insulation
 - B. Drawbacks
- IV. Prefabricated Walls
 - A. Reduced waste
 - B. Higher quality

Chapter 3. Air Barriers

(Video length 19 minutes)

****Learning Objectives:*** 1) Apply the benefits of energy efficient building. 2) Describe the purpose of air barriers and what materials are typically used. 3) List the uses of SIPs and ICFs.

- I. Design and Implementation of Energy Efficient Design
 - A. Design phase
 - B. Subs and employees
 - C. Training
- II. Air Sealing
 - A. Finding leaks
 - B. Materials
- III. Airtight Drywall
 - A. Methods
 - B. Drawbacks
- IV. Prefabricated Walls
 - A. Reduced waste
 - B. Higher quality

- C. SIPs
- D. ICFs

Chapter 4. Insulation

(Video length 18 minutes)

***Learning Objectives:** 1) Recognize the pros and cons of fiberglass and cellulose insulation material. 2) Describe the proper installation of fiberglass insulation. 3) Apply proper installation of cellulose insulation.

I. Fiberglass Batts

- A. Uses
- B. Various configurations: high density, standard density
- C. Installation

II. Cellulose Insulation

- A. Uses
- B. Various configurations: dense packed, dry spray

III. Roof Installation

- A. Methods
- B. Baffles

Chapter 5. Foam Insulation/Sheathing

(Video length 22 minutes)

***Learning Objectives:** 1) Identify different types of foam insulation available. 2) Understand the pros and cons of polyisocyanurate and polyurethane spray foam. 3) Demonstrate the many uses of both EPS and XPS insulating sheathing.

I. Spray Foam

- A. Urea Formaldehyde
- B. Cementitious
- C. Phenolic
- D. Polyisocyanurate or polyiso
- E. Polyurethane

II. Various configurations

- A. Open cell, Closed cell

III. Insulating Sheathing

- A. Uses
- B. Examples: expanded, extruded

Chapter 6. U-Factor/R-Value

(Video length 21 minutes)

***Learning Objectives:** 1) Recognize the uses of and effectiveness of radiant barriers. 2) Identify and define what the National Fenestration Rating Council does. 3) Formulate U-Factor and R-Value conversions. 4) Explore different methods to increase U-Factor.

I. Radiant Barrier Sheathing

- A. Benefits
- B. Heat Transfer
- C. Types

II. Window selection

- A. NFRC
- B. SHGC
- C. Low E coatings
- D. Inert gas
- E. Visible Transmittance
- F. Air Infiltration Rate

III. U-Factor/R-Value

A. Definitions/Conversions

Chapter 7. Lighting/Duct Design

(Video length 19 minutes)

***Learning Objectives:** 1) What are the positives and negatives of incandescent or compact fluorescent lighting? 2) Understand the amount of energy wasted by poor duct design 3) Determine proper duct design and installation.

I. Incandescent Lighting

A. Benefits/Flaws

II. Compact Fluorescent Lighting

A. Benefits/Flaws

III. Light Emitting Diodes

A. Benefits/Flaws

IV. Duct Design

- A. Best Practices
- B. Duct Sealing
- C. Installation
- D. Common Problems

Chapter 8. Green Appliances

(Video length 25 minutes)

***Learning Objectives:** 1) Understand how to read energy guide labels. 2) Define heat/energy recovery ventilation. 3) Identify sealed combustion appliances. 4) List different types of water heaters. 5) Define and be able to understand what a SEER rating is.

I. Energy Guide Labels

A. What does it all mean?

II. Energy Recovery Ventilation

A. Benefits/Costs

III. Sealed Combustion Heating Appliances

A. Description

B. Benefits

IV. Water Heaters

A. Standard tank

B. Condensing

C. Tankless

D. Common Problems

V. Seasonal Energy Efficiency Ratio (SEER)

Chapter 9. Geothermal/Solar

(Video length 23 minutes)

***Learning Objectives:** 1) Recognize the features and benefits of a geothermal system. 2) Identify different types of geothermal designs. 3) Examine what a solar thermal water heating system is and how it works.

I. Geothermal Heating and Cooling

A. How does it work?

B. Return on investment

II. System Types

- A. Water loop
- B. Direct exchange
- C. Heat pumps

III. Solar Thermal Water Heating

- A. Description
- B. Benefits
- C. Types

Chapter 10. Green Marketing

(Video length 16:39 minutes)

***Learning Objectives:** 1) Explore ways to reduce waste material from the jobsite. 2) Recognize the importance of a well trained Green Building sales and marketing team. 3) Identify the types of solar photovoltaic roofing products available. 4) Understand fuel cell basics.

I. Waste management

- A. Reducing and recycling

II. Marketing

- A. Budgeting
- B. Staff
- C. Education
- D. Tools/Programs available

III. Solar Voltaic Roofing

- A. Asphalt, metal, slate
- B. Building integrated products
- C. Return on investment

IV. Fuel Cells

- A. How it works
- B. Benefits

Chapter 11. 2011 Oregon Energy Code

***Learning Objectives:** 1) Describe the details regarding the building features and equipment systems as they pertain to the Oregon Energy code. 2) Recognize how the changes can ultimately reduce and conserve energy consumption.

- I. Energy Conservation
 - A. Scope
 - B. Compliance
- II. Exterior Envelope Requirements
 - A. Insulation
 - B. Doors/Windows
 - C. Walls
 - D. Roof/Ceilings
 - E. Air Leakage
 - F. Moisture Control
- III. HVAC
- IV. Lighting
- V. Alternative System Analysis
- VI. Fenestration Standards

Chapter 12. Green Building Overview

***Learning Objectives:** 1) Recognize the value of “building green”; from both the perspective of the builder and the building owner. 2) Understand

the importance of evaluating the project site. 3) Be aware of available strategies to reduce heating and cooling costs.

- I. Implications of green building
- II. Site remediation strategies
- III. "Green" power generation
- IV. LEED rating system

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