Building Science for the BC Energy Step Code (Module 3)

9-12 hours to complete with review of content, final test and review of downloadable materials

2 sections

Quizzes: unlimited attempts
Exam: 100 questions each, one attempt

Passing mark on Exam = 70

COURSE DESCRIPTION

This course meets the **BC Energy Step Code Module 3: Building Science** mandatory training for builders as required by BC Housing (as of Oct 2022). This module builds on basic building science principles and applies building science principles to design and construction practices required to meet the "envelope first" approach.

The training goals for this course are:

- To apply building science principles to help in the selection of durable building components, assemblies, and construction approaches in the diverse British Columbia climate and market.
- To use industry resources to determine appropriate enclosure components and assemblies, mechanical components, and construction approaches that can be used to meet the current and future requirements of the BCESC and achieve best practices.

We gratefully acknowledge the financial support of BC Housing through the Building Excellence Research & Education Grants Program.

Building Science for the BC Energy Step Code (Module 3)
COURSE OUTLINE

LEARNING OBJECTIVES

Section 1

- *Identify the key characteristics of typical building assemblies that impact the energy performance of the building*
- *List the key enclosure selection criteria that affect the building construction cost and schedule*
- *Use building science principles to guide the evolution of the design and construction of building enclosures with increased R- value in the "envelope first" approach, accounting for BC's five climate zones and diverse building types and occupancies*
- *Assess and mitigate the potential impacts of solar heat gain on occupant comfort, including a basic understanding of the solar heat gain coefficient, low-e coatings, window operability, and influence of mechanical systems*

Section 2

- *Differentiate between enclosure elements and construction practices for achieving airtightness and those intended for vapour control*
- *Find typical ranges of assembly R-values associated with wood- frame, below-grade concrete and wood-frame roof assemblies*
- *Be mindful of prescriptive code items that still apply to building enclosures even if they are used as part of performance-based compliance and of design approaches that may require design professional involvement/sign-off during assembly selection*
- *Consider the five key design and construction criteria of cost efficiency, constructability, air- tightness, moisture durability, and sustainability in selecting an appropriate enclosure assembly*
- *Assess the benefits of an exterior-insulated assembly compared to an interior-insulated assembly in terms of building science principles*
- *Evaluate a window product based on key characteristics including NAFs rating, energy, durability, design options*
- *Evaluate industry resources, product documentation, and training programs for their suitability as tools for builders in the context of the BCESC, including for diverse builder teams and building design perspectives*

Building Science for the BC Energy Step Code (Module 3)

COURSE OUTLINE

Introduction

Health Comfort & Moisture Management
Key Characteristics of Building Assemblies
- *Related to Moisture Issues Related to Air Flow Issues*
- *Related to Heat Loss issues*

Section 1: Building Science Principles

Heat Flow Principles
- *Convection*
- *Conduction*
- *Radiation*

Air Flow Principles
- *Wind Effect*
- *Stack Effect*
- *Combustion & Ventilation Effect*
- *Neutral Pressure Plane*

Moisture Flow Principles
- *Water Vapour*
- *Humidity*
- *Solar Vapour Drive*
- *Ice Damming*

Indoor Air Quality
Occupant Comfort
- *Passive Solar*
- *Windows*
- *Natural Ventilation*
- *Heat Loss/Heat Gain*

Control Layers
- *Vapour Barriers*
- *Air Barriers*
- *Dew Point*

Section 2: Best Practices & Building Science

BCESC Compliance
- *Effective R-values*

Cost
Efficiency
Moisture Durability
Sustainability
Exterior Insulated Assemblies
Windows
- *Performance Characteristics*
- *U-factor*
- *Standards*
- *Ratings Programs*
- *Code Compliance*

BC Climate & Market
- *Durable Components*
- *Construction Approaches*

Impact of Building Assemblies on Energy Performance