Course Narrative & Learning Objectives

Course Objectives: After your students complete this course, they will be able to:

• Explain how reducing building energy will reduce the effects of climate change.
• Describe the basic elements of, green, high-performance construction and building operations.
• Describe the role of trades on high-performance job sites.
• Describe energy-consuming building systems and strategies to reduce building energy use.

The course has two main sections. The first, Part A: Sustainability, describes why high-performance buildings are necessary. Part B: Green Building Practices, identifies the strategies used by teams to design, build and operate high-performance buildings.

Below are section-by-section objectives for each chapter of the course.

Part A: Sustainability

Chapter 1: Connection Between Buildings and Climate Change
• Explain the connection between buildings and climate change
• Define site energy and source energy and explain the difference
• Explain what sustainability is and provide a definition

Chapter 2: What are High-Performance Buildings?
• Define high-performance buildings
• Explain what systems thinking is and how it applies to green building
• Define Whole Building Approach and Integrated Project Delivery

Chapter 3: Causes and Effects of Climate Change
• Explain how climate change works
• Explain the effects of climate change
• Explain the limits of global warming and consequences of not taking immediate action
• Note that Fundamentals includes an explanation of climate change. This content may be antithetical to some of your students’ prior beliefs. Please explain that this portion of the course is meant to provide accurate, scientifically-based facts about important global issues.

Chapter 4: Working Towards Solutions
• Recall environmental solutions that the U.S. and partner countries have implemented to achieve success.
• Identify the difference in mitigation and adaptation as responses to climate change.
• Name at least one mitigation and adaptation strategy

Chapter 5: Value of High-Performance Buildings
• Explain how building performance affects first costs and operational costs
• Describe the value proposition for green buildings.
• Give at least two examples of how green building will create future jobs

Part B: Green Building Practices

Chapter 6: Small Changes, Huge Impact
• Explain how buildings use energy
• Describe the strategies that will lead to better performing buildings
Chapter 7: Tight Building Envelope
- Explain how the building envelope plays an important role in the energy consumption of buildings.
- Describe how heat flows in a building.
- Explain how continuous thermal barrier and air barrier conserve a building’s energy use.
- Describe the criteria of properly installed insulation.

Chapter 8: Right-Sized HVAC
- Explain the relationship between the quality of the building envelope and the size of the heating and cooling loads.
- Describe the energy cost from ventilation.
- Explain how an energy recovery ventilator (ERV) works and how it saves energy.

Chapter 9: Water Conservation
- Explain the relationship between water waste and energy waste (water-energy nexus).
- Explain how much water can be conserved by using ENERGY STAR and WaterRx appliances and fixtures.
- Describe how water reuse & alternative wastewater systems conserve potable water.
- Describe one way that renewable energy can be used to heat water.

Chapter 10: Efficient Lighting and Electrical Systems
- Explain what drives the amount of energy that lighting systems use.
- Explain several ways reduce lighting energy.
- Describe what a net zero energy building is and how to achieve one.
- List several sources of renewable energy.

Chapter 11: Healthy Indoor Environments
- Explain why healthy indoor air is an important component of green building.
- Describe how green construction and operations processes contribute to the health of the people working on or in the building.
- Explain what a CIAQ plan is and what it includes.

Chapter 12: Environmentally-Friendly Materials
- Explain the concept of embodied energy.
- Explain what life cycle assessment is and how it applies to buildings.
- Describe the 3Rs and why their order is important.
- Explain what CWM is and how it applies to construction work.

Chapter 13: Codes and Commissioning
- Explain what commissioning is and why it is important to commission high-performing buildings.
- Describe the difference between a code and standard.
- Describe the trends of energy codes over time and how that effects buildings.
- Describe LEED.

Chapter 14: Optimizing Existing Buildings
- Explain the importance of building operators as related to the performance of the building.
- Describe the process of Existing Building Commissioning.
- Explain some of the processes and benefits of green cleaning.