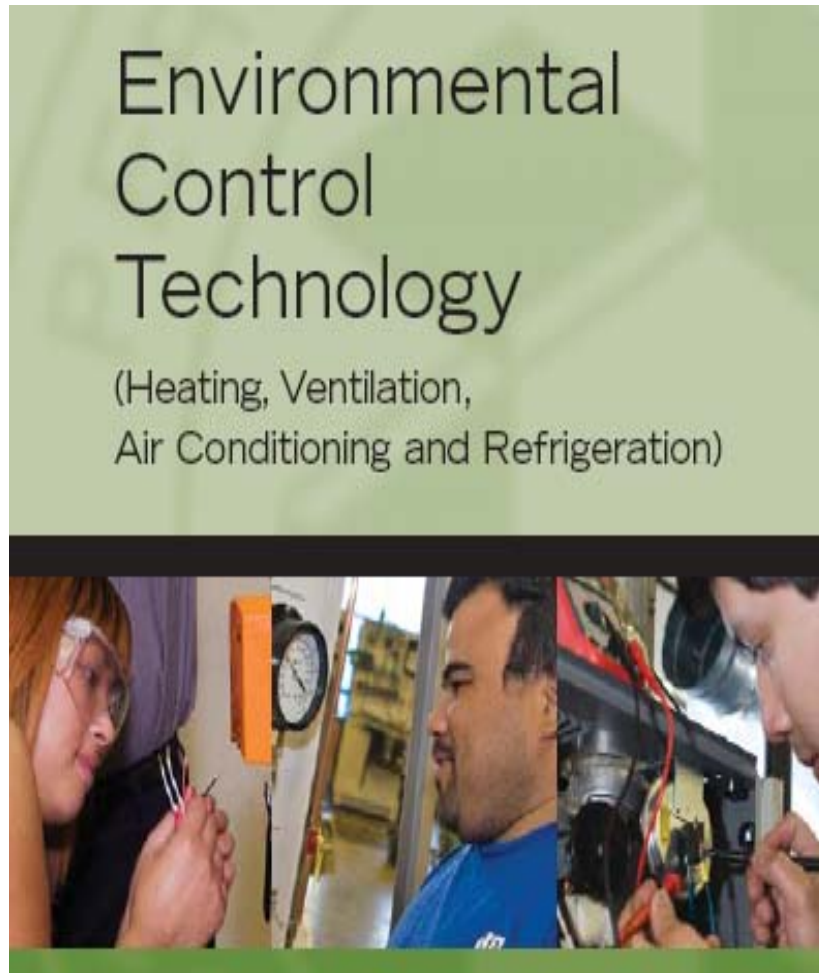


# PROBLEM BASED LEARNING



## ECT 18: Residential and Light Commercial HVAC Installation

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## Overview: Problem Based Learning (PBL) Scenario

The problem base learning scenario will be broken down into the following class sessions and course concepts.

CLASS SESSION: 1-3	
<b>In class:</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Introduction to Problem Based Learning (PBL) Approach</li> <li><input type="checkbox"/> Divide the class into groups (4-5 people per group)</li> <li><input type="checkbox"/> Receive the assigned Problem Based Learning scenario</li> <li><input type="checkbox"/> Review design and installation fundamentals</li> <li><input type="checkbox"/> Introduction to manual and software load calculation</li> </ul>
<b>Outside of class:</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Analyze the problem                             <ul style="list-style-type: none"> <li>• Create a file folder that includes the documentation of the problem and its process (For example: Recording your thought process, digital pictures of the house, gathering resources and information)</li> </ul> </li> </ul>
CLASS SESSION: 4-7	
<b>In class:</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Identify and fix the problem</li> <li><input type="checkbox"/> Gather information                             <ul style="list-style-type: none"> <li>• Use “Need to Know” to compile facts (see packet for worksheet)</li> <li>• Perform design and installation procedures (which include but are not limited to: Load calculations, proper register location, cutting floors, sizing and properly installing duct work, installing vent pipes and gas lines, and electrical wiring)</li> </ul> </li> </ul>
<b>Outside of class:</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Continue documenting the problem and its process</li> <li><input type="checkbox"/> Create a group Power Point Presentation that identifies the problem and provides a solution(s)                             <ul style="list-style-type: none"> <li>• Divide the tasks among the group members so that each person presents a different section of the presentation (1-2 minutes per group member)</li> <li>• The day of the presentation group members <u>must</u> dress in professional/business attire</li> <li>• Final presentation components must include: individual and team evaluations (see packet for guidelines)</li> </ul> </li> </ul>
CLASS SESSION: 8	
<b>In class:</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Turn in a completed Portfolio (binder) containing the documentation of the problem and its process from beginning to end</li> <li><input type="checkbox"/> Class Final - Group Power Point presentations and turn in completed evaluations</li> </ul>

## **PROBLEM BASED LEARNING (PBL) SCENARIO**

**Instructor:** Nick Kyriakopedi

**Course:** Residential and Light Commercial HVAC Installation Practices

**Course Number/Code:** ECT 18

### **SCENARIO TITLE**

“Installation of a furnace in a Residential House”

### **Course Concept:**

The course concept used in this scenario is how to properly size and install a furnace in a residential house.

### **SCENARIO DURATION**

The problem base scenario will be integrated and performed within eight class periods.

### **BUSINESS PARTNER**

Laney College, Environmental Control and Technology (ECT) Department

### **LEARNING OBJECTIVES**

By the end of the semester, students will be able to demonstrate the ability to:

- Collect, organize, and analyze information
- Determine the problem, provide solution(s) and recommendations
- Properly install equipment
- Create a Portfolio (binder) that documents the problem and its process
- Properly size equipment
- Safely handle materials and tools used for cutting, bending, etc
- Follow proper and safe techniques when wiring, installing ducts and gas pipes
- Demonstrate proper procedures when measuring, cutting and threading black pipe
- Explain local and state code requirements for proper installation practices
- Demonstrate good communication skills when working with peers in teams

### **THE FOCUS OF THE PROBLEM**

- The focus of this Problem Based Learning (PBL) scenario is based around a real life scenario.

In various settings, the Problem Based Learning (PBL) scenario may be presented as a real time problem, hands-on scenario, or hypothetical problem. Using critical thinking and investigation skills, the students go through a process to solve a problem and provide recommendations for a solution.

### **PROBLEMATIC SITUATION**

As winter approaches, Nick needs to install a furnace to keep his house warm. Nick would like to hire a contractor to identify the type of furnace he needs and where to install it taking into consideration the design, location, and aesthetics of his house. As a group, identify how to gather the information and the steps required to properly install a new furnace considering Nick's needs and expectations.

### **STUDENT MATERIALS**

The instructor will provide students with the following information:

- A copy of the Problem Based Learning (PBL) cycle and steps
- An explanation of the Problem Based Learning (PBL) approach
- Worksheet: "Need to Know Board" to gather information
- Worksheet: Scoring rubric for final presentation
- Worksheet: Team members evaluation
- Problem Based Learning (PBL) scenario evaluation online survey

### **Resources and Media:**

- Internet
- Educational materials and books
- Industry resources
- Videos, CD and DVD on HVAC equipment

### **Required Supplies:**

- Pencils and colored felt tip pens
- Graph paper with 1/8" squares
- Circle template
- Line paper
- Safety glasses
- Gloves
- Medium flat blade and Philips screwdriver
- 1/4" and 5/16" nut drivers
- Two adjustable wrenches one 8" and one 12"
- Tool box or pouch

### **Recommended Tools:**

- Power drill
- Sheet metal cutters
- Sheet metal bender
- Hammer
- Socket set

**INSTRUCTOR ROLE**

The instructor will support the Problem Based Learning (PBL) experience by:

- Introducing the scenario and its process
- Facilitating reflection and discussion
- Providing applicable resources and materials
- Answering any questions related to the scenario and coursework
- Providing class time to work on the scenario

**STUDENT ROLE AND GUIDELINES****Individual**

The intended outcome will be measured by having each student:

- Demonstrate safe installation procedures
- Perform proper and safe use of tools
- Collect information in order to identify and solve the problem
- Demonstrate a specific individual role in their team
- Execute a specific individual role in the final presentation
- Complete a Problem Based Learning (PBL) scenario evaluation as a part of the final project

**Group:** Each group will consist of 4-5 students

The intended outcome will be measured by providing:

- A Power Point presentation where each student will dress in business attire and orally present a part of the group presentation (1-2 minutes per group member)
- Compile a file folder that includes the documentation of the problem and its process

**STUDENT FEEDBACK**

As a team, and individually - students will review, assess and provide feedback regarding the Problem Based Learning (PBL) scenario experience.

Requirements of the final project:

- Completion of a short Problem Based Learning (PBL) questionnaire
- Completion of a short team member evaluation

**TEAM LINK**

The instructor will support the team learning process by:

- Allocating time to meet during class
- Encouraging students to use additional time outside of class and on the phone to work on the scenario

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Milwaukee Area Technical College - Sustainable Facilities Operations

Laney College - Commercial HVAC Systems

City College San Francisco - Commercial Building Energy Analysis & Audits

## Professional Development Materials, Presentations & Videos

National Institutes

Building Automation Systems Instructor Workshops

Webinars (e.g., BEST Talks)

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## Reports & Case Studies

## Marketing Resources

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