



INSTRUCTOR'S GUIDE/LESSON PLAN

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1. COURSE OVERVIEW

ABOUT THIS INSTRUCTOR'S GUIDE

This sample lesson is for all audiences, but focuses primarily on Building Science, energy auditing, and diagnostic testing in the home. With the use of the SimBuilding game, Infrared Thermography is highlighted as well as the integration of pressure diagnostics to test for air leakage, moisture infiltration, and weaknesses in the thermal envelope.

Online course: No class limit.

Classroom: Constraint is number of computers (students can pair up) and speed of internet access.

TARGET AUDIENCE

This is a beginner building science lesson which should be accessible to people with elementary knowledge of construction.

LEARNING OBJECTIVES

By attending this session, participants will be able to:

- Explain the different ways heat, air, and moisture move within a building.
- Identify how Infrared Thermography works
- Inspect a home for basic information to inform building diagnostics, such as framing, existing insulation, window and door installation
- Analyze Infrared Thermography for points of air leakage, thermal bridging, and needed weatherization retrofitting in a home's thermal envelope.
- Discuss the value of using Infrared Thermography with Pressure Diagnostics in order to determine air leakage points

MATERIALS AND EQUIPMENT NEEDED

Note: Because this is an online exercise, the lists below are only for the event that this course is taught in a classroom.

MATERIALS	EQUIPMENT (classroom)
PowerPoint slides or online Videos Student handouts Whiteboard Dry erase markers	Projector Computers with reliable internet connection – 1 for every 2 students Keyboards for computers – either attached or wireless if using tablets Infrared Camera (strongly encouraged for demonstration purposes)

WORKSHOP SCHEDULE (SEE SECTION 4 FOR AGENDA)

Below is a suggested schedule for classroom. Breaks are generally taken every hour. There are two options for the schedule dependent upon student prior knowledge of the subject—which will be tested at the beginning of class.

SECTION	TIME
Introductions, Knowledge Pre-Test and Review	45min
Option 1: Building Science Principles powerpoint and video	1hr
Infrared Basics powerpoint	30min
SimBuilding game	1hr
Review/Evaluation	30min
Option 2: Building Science is No BS video	15min
Infrared Basics powerpoint	15-30min
Choice of IR Camera activity or Blower Door powerpoint	15-45min
SimBuilding game with Auditor worksheet	1.5hrs
Review/Evaluation	30min

CLASSROOM PREPARATION CHECKLIST

✓	TASK
	Confirm working computers, software/files, projector, cables
	Handouts are printed
	Whiteboard (or flipcharts) & pens are available
	Internet access available in classroom
	Infrared Camera battery charged

2. RESOURCES

HANDOUTS AND INTERNET RESOURCES

All of the below are available on the SimBuilding.info website, under Instructor Resources:

Knowledge Pre-Test

Principles of Building Science handout (for student reference after class)

Emissivity handout (for student reference after class)

Auditor Worksheet

**YouTube videos are also referenced in the Agenda. Be sure internet is working prior to class.

CLASSROOM PROPS AND HANDS-ON ACTIVITIES

Infrared Camera (strongly encouraged for groups with prior Building Science knowledge)

3. INSTRUCTION NOTES

Instruction notes can be found in the Notes sections of the Powerpoint presentations. Please refer to PowerPoint presentations: **Building Science Principles.pptx**, **IR Basics.pptx**, and **Blower Door Basics.pptx**, all of which are available on the website, Simbuilding.info, under Instructor Resources. It is suggested that each instructor select the most appropriate slides for their audience, based upon their experience, familiarity with Building Science, and Infrared technology.

Please note, these presentations are the same ones used to create the videos available on the SimBuilding.info Instructor Resources site. If you feel that they cover the material you are interested in, you can just play the videos for your students.

4. COURSE INSTRUCTION

AGENDA

CLASSROOM INSTRUCTION	
Introductions and Knowledge Pre-Test: Handout pre-test and give students approximately 15 minutes to complete it. Ask them to hold on to it when they are finished.	30 min
Review Pre-Test as a group to determine level of knowledge of Building Science. Again, ask students to hold on to test so that they can take notes on it if they see fit.	15 min

Option 1: If pre-test shows that nearly half of the students have little to no knowledge of building science, proceed to the Principles of Building Science powerpoint or video. Both sets of powerpoints are available as videos with narration on the SimBuilding.info website as well. If you prefer to highlight or focus in on particular topics, tailor the powerpoints to your needs and ignore the videos.

PowerPoint/Video: Building Science Principles Video: Air Pressure: Balloon and Bottle Experiment https://www.youtube.com/watch?v=CXd2h5O80U Video: Building Science is No BS https://www.youtube.com/watch?v=LSAygAiUh-o	1 hour
Powerpoint/Video: IR Basics Activity: Infrared Camera introduction (if available)	45 min
The SimBuilding Game: Students can work in pairs if computers are limited or if group has no prior knowledge of Building Science. Direct students to SimBuilding.info and follow links to open the SimBuilding game. It is recommended strongly that students go through the	1 hour

tutorial before attempting the game—it gives important details about navigating the game that can minimize frustration.	
Review Knowledge Pre-Test again, to see if there are questions that students still don't know how to answer. Pass out any evaluation your organization may require.	30 min
End of Lesson Option 1	

Option 2: If pre-test shows that most students have knowledge of building science, proceed to the Building Science is No BS video and IR Basics powerpoint. The powerpoint, as well as one on Blower Door Basics, is on the website.

Video: Building Science is No BS https://www.youtube.com/watch?v=LSAygAiUh-o This video is a quick review of Building Science concepts that should set the tone so that you can focus on the particulars of building diagnostics, such as infrared thermography.	15 min
Power Point: IR Basics IR Basics is also available as a video with narration at the bottom of the page http://www.simbuilding.info/instructor-resources.html . If you prefer to highlight or focus in on particular topics, tailor the powerpoint to your needs and ignore the video.	15-30min
Activity: Infrared Camera introduction (if available, but strongly encouraged) OR Powerpoint: Blower Door Basics	15-45min
The SimBuilding Game/Auditor Worksheet: Students can work in pairs if computers are limited. Direct students to SimBuilding.info and follow links to open the SimBuilding game. It is recommended strongly that students go through the tutorial before attempting the game—it gives important details about navigating the game that can minimize frustration. Handout EA worksheet, if relevant to your coursework. This worksheet offers a different perspective on the game. Not only are students attempting to find all the hotspots, but they are making detailed observations of the home like an Energy Auditor would need to.	1.5 hours
Review Knowledge Pre-Test OR Evaluation: See if there are questions that students still don't know how to answer. OR Pass out any evaluation your organization may require.	30min
End of Lesson Option 2	