

IBS Advisors, LLC
HERS Rater Course Curriculum

HERS Rater Course

I. Course Information

This course is designed to teach the knowledge base and skills necessary to produce accurate and reliable home energy ratings according to the latest standards published by RESNET.

Advisory: a background in residential construction, code inspections, or mechanical engineering is recommended.

50 hours lecture, 10 hours field/laboratory-lecture

II. Course Objectives

The candidate will demonstrate the following outcomes:

- A. Ability to use the language of residential construction and building physics
- B. Knowledge of the fundamentals of the movement of heat, air and water and how they interact with different building assemblies
 - a. Ability to calculate heat flow, U-factors, R-value, and heat flow in parallel paths
 - b. Knowledge of the different methods used to control the movement of heat (conductive, convective and radiant) in residences
 - c. Knowledge of the different methods used to control the movement of water in residences
- C. Ability to calculate area, volume, length and slope of different geometric shapes commonly found in residential construction
- D. Knowledge of the different methods used to control the movement of air in residences
- E. Knowledge of the different types of thermal distribution systems commonly found in residential construction
- F. Ability to diagnose building energy consumption, durability and comfort problems

- a. Ability to operate the blower door to test the home for air infiltration
- b. Ability to operate the DuctBlaster™ to test the thermal distribution system for leakage to the outside as well as total leakage
- c. Ability to measure zonal pressure differences within the home
- d. Ability to measure dominant duct leakage and knowledge of the consequences of duct leakage
- e. Ability to test combustion appliance zones under worst-case depressurization
- f. Ability to determine effect of series leak paths
- G. Knowledge of the different types of ventilation systems and the benefits and consequences of each type
- H. Knowledge of the principles of higher quality indoor air
 - a. Knowledge of the effects of carbon monoxide on occupants
 - b. Knowledge of the principles and code governing combustion air for appliances
 - c. Knowledge of the effects of soil gases and how to deal with them in a built environment
 - d. Knowledge of the sources of indoor air pollution
 - e. Ability to calculate indoor moisture generation rates
- I. Ability to calculate condensing surface potential within a wall assembly
- J. Knowledge of the basic principles of human comfort
 - a. Knowledge of how heating and cooling loads are calculated
 - b. Knowledge of how to size and select HVAC equipment
 - c. Knowledge of the principles behind thermal distribution system design and installation
 - d. Knowledge of heating and cooling design trade-offs
- K. Ability to identify different types of residential construction
 - a. Knowledge of the different types of residential construction materials and methods
 - b. Knowledge of how foundations (slabs, crawlspaces, basements) are constructed and the impact of those construction types on energy consumption
 - c. Knowledge of how framed floors are constructed and the impact of those construction types on energy consumption
 - d. Knowledge of how wall assemblies are constructed and the impact of those construction types on energy consumption

- e. Knowledge of the properties of mass wall assemblies and their impact on energy consumption
 - f. Knowledge of the performance factors of windows and doors and their impact on energy consumption
 - g. Knowledge of the different types of ceiling-roof constructions and their impact on energy consumption
 - h. Knowledge of the impact of air infiltration/exfiltration on energy consumption
 - i. Knowledge of the different types of insulation materials used in residential construction and their impacts on energy consumption
- L. Ability to identify the different types of HVAC systems (furnaces, boilers, baseboard hydronic radiant, combination space & water heating, air source heat pumps, ground source heat pumps, cooling systems)
 - M. Ability to identify the different types of domestic water heating systems (combustion, electric resistance, heat pump, tankless, solar)
 - N. Ability to determine the efficiency ratings of HVAC and domestic water heating equipment
 - O. Ability to determine the size of the HVAC and domestic water heating equipment
 - P. Ability to determine the different types of HVAC controls
 - Q. Knowledge of the principles of passive solar design
 - R. Ability to identify and document renewable energy systems
 - S. Knowledge of projected versus confirmed ratings
 - T. Ability to characterize and document the residential building envelope and comfort system features during a field inspection
 - a. Foundation types
 - b. Floor types
 - c. Wall types
 - d. Ceiling-roof types
 - e. Window & door types and performance factors
 - f. Insulation types, thickness, thermal performance & weighted average thermal values
 - g. Thermal distribution system types, insulation value, and location with respect to the building envelope
 - h. HVAC equipment efficiencies, size, location with respect to the building envelope

- i. Domestic water heating equipment efficiencies, size, location with respect to the building envelope
- U. Knowledge of the HERS program qualifications, technical standards and uses
 - a. Knowledge of the HERS Reference home
 - b. Knowledge of how the HERS Index is calculated
 - c. Knowledge of the Home Energy Rater Standards of Practice
 - d. Knowledge of the ENERGY STAR® program
- V. Knowledge of construction documents (construction drawings, specifications, general and specific notes)
- W. Ability to measure a residence accurately
- X. Ability to accurately determine the orientation of the building
- Y. Ability to complete a scaled sketch
- Z. Knowledge of the standards on ethics and disclosure
- AA. Knowledge of the quality assurance process
- BB. Knowledge of real estate financing
 - a. Energy Efficient Mortgages
 - b. Energy Improvement Mortgages
- CC. Knowledge of the ICC Climate Zone system
- DD. Knowledge of basic & common energy code requirements
- EE. Ability to enter collected field data into an approved Energy Analysis tool
 - a. Ability to collect and enter reliable utility pricing
 - b. Ability to analyze results for improvement analysis
 - c. Ability to issue reports to clients
- FF. Office administration and documentation
- GG. Business Operations

III. Essential Student Materials

- A. Laptop computer running Windows XP or higher, with USB port
- B. USB jump drive
- C. Calculator
- D. 35' tape measure
- E. Hard hat
- F. Architects scale
- G. Pen or pencil
- H. Notepad
- I. Flashlight

J. Compass

IV. Assignments

- A. Reading of text
- B. Answering Review Questions for each chapter
- C. Class participation which may include:
 - i. Collaborative problem solving
 - ii. Orally presenting solutions to questions posed by Trainer

V. Methods of Evaluating Objectives

- A. Classroom quizzes and/or problem-solving assignments based upon text and presentation
- B. Oral exam on operation and troubleshooting of blower door
- C. Oral exam on operation and troubleshooting of DuctBlaster™
- D. Electronic written exam on RESNET National Core Competencies

VI. Texts & Supporting References

Texts:

Dillon, Brett. *Home Energy Rater Manual*. San Antonio, TX: IBS Advisors, LLC, 2007

Supporting References:

RESNET. 2006 Mortgage Industry National Home Energy Rating Systems Standards