Energy Advisor Foundation Exam Prep

50-70 hours to complete with review of content, final test and review of downloadable materials

6 modules, 115 learning sessions

Module Quizzes: Timed, multiple choice, unlimited attempts
Timed Final Exam: 150 questions, unlimited attempts

Passing mark on Section Exams = 70

BLUE HOUSE ENERGY

COURSE DESCRIPTION

This course covers the competency guidelines for Natural Resources Energy Advisor Foundation Exam. The guidelines are broken out into seven categories:

1. Communication and Computer Skills (these are not on the exam)
2. Numeracy (Arithmetic and Geometry)
3. Construction and Renovation of Low Rise Housing
4. Safety Considerations
5. Building Envelope (New and Existing Homes)
6. Heating, Ventilation, and Air Conditioning (New and Existing Homes)
7. Building Science Principles and the House-as-a-System Concept

Your training plan covers these categories (and more!), but we've laid it out in a different sequence so that you can 'ladder', or build up, your knowledge and understanding as you go. The way we've laid it out is based on good instructional design principles and the latest in brain science and adult learning. We want you to succeed by getting the strongest Foundation!

You will learn each concept and topic through a short video lesson, a worksheet that helps you to apply what you learned in the video to a real-world situation, and some questions or actions that will help you solidify your understanding of the topic. You get points for each piece you complete.

There's a community forum where you can ask questions, and a curated resource list that you can sort and filter to suit your own path. Our learning platform also comes with an AI assistant that will help you find the information you want when it comes to review and study time.

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COURSE DESCRIPTION

Here's how it goes. You start with an overview of the Energy Advisor role. Then you learn about the physical parts of the house, construction types, how to read plans, and basic safety considerations.

Next, it's on to building science. You learn to identify air, heat, and moisture flows, problems and challenges associated with them, and how to improve the performance of the house. Then its mechanical systems - space heating and cooling, ventilation, and hot water. You learn how to identify equipment found in existing houses as well as the best options for new construction.

The final module is all about how to prepare for the exam: tips, strategies, and a timed practice exam.

Use the links below to jump to the outline of each section or module:

NOTE: Math is incorporated into the worksheets, actions and challenges. You need to be able to calculate perimeter, area, and volume as well as convert between metric and imperial units. If your basic arithmetic and geometry skills are rusty, visit the Khan Academy. It's free, or pay what you want. Here are the links:

Basic math review: https://www.khanacademy.org/math/early-math
Arithmetic: https://www.khanacademy.org/math/arithmetic
Geometry: https://www.khanacademy.org/math/basic-geo
All of the Khan Academy math courses: https://www.khanacademy.org/math

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TOP LEVEL LEARNING OBJECTIVES

Construction Math

- *Use and understand all operations on whole numbers, fractions and decimals commonly used in the construction industry*
- *Calculate the perimeter, circumference, area, and volume of various shapes and figures including floor and roof areas, concrete footings, slabs, walls, and columns*
- *Convert measurements from fractions to decimals*
- *Convert measurements between metric and imperial systems*

Plans Reading

- *Demonstrate an elementary knowledge of plan reading as it relates to home construction*
- *Demonstrate ability to read floor plans*
- *Demonstrate ability to read elevation, section, and detail drawings*

Construction Safety

- *Describe ladder safety protocol*
- *Describe construction site safety protocols*
- *List safety equipment*
- *Identify electrical shock and electrical fire hazards*

Building Science, Control Layers, The Envelope First, Comfort and Energy

- *Apply the House as a System Concept*
- *Interpret the role of sustainable development in construction*
- *Understand how building science affects building durability and occupant comfort*
- *Categorize the signs, symptoms and solutions for good indoor air quality*
- *Describe building envelope details*
- *Identify how the control or contribute to heat, air, and moisture flows*
- *Distinguish between mechanical systems*

High Performance Housing

- *Describe the characteristics of net zero energy and high performance new construction*
- *Provide examples of envelope assemblies and systems that are suitable for net zero energy and high performance housing*
- *List advanced mechanical systems suitable for net zero energy construction*
- *Explain the impact of occupant behaviour on energy use and reaching net zero energy targets*
- *Discuss, at a high level, the properties and features of residential renewable energy systems*

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COURSE OUTLINE

DO YOUR HOMEWORK!

WHAT AN ENERGY ADVISOR DOES
And what you to know to become one

- Soft skills
- Breadth of knowledge
- Day in the life

WHAT'S YOUR (HOUSE) TYPE?
14,000,000 houses, 12 types

- Single detached
- Semi detached & row houses
- Part 9 MURBS

TRAIN YOUR EYE
Putting a house into perspective

- Math and construction
- Roof slopes or pitches
- Scale & proportion

HOW TO DATE A HOUSE
Construction methods through the years

- House Styles by period
- Below grade construction types
- Above grade construction types

BUILDING STRUCTURE/COMPONENTS
What makes a building stand up?

- Foundations
- Above Grade Construction

THE HOUSE AS A SYSTEM
99 elements and they're all connected

- Overview of concept & context
- Dynamics

THE ENVELOPE FIRST
Invest in the house not the heating

- Address the permanent parts
- Solve for thermal comfort

KEEP WATER OUT, OFF, AND AWAY
Exterior moisture management is key

- Roof
- Walls
- Foundation

TIMED MODULE ASSESSMENT

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COURSE OUTLINE

PLANS READING

OVERVIEW

- Introduction
- History
- Basic Concepts

COMMUNICATION

- Language of construction
- Phases of drawings
- Identification of drawing series

NAVIGATING PLANS

- What's in a drawing set
- Plans and Elevation drawings
- Scale and grid

FLOOR PLANS

- Line weights
- Line types
- Grid lines and labels

SYMBOLS & ABBREVIATIONS

- Horizontal slice
- Symbol sets
- Dimensions
- Designations
- Schedules

KEY FEATURES IN PLAN VIEW

- Doors and windows
- Finishes
- Equipment

ELEVATIONS

- Purpose and use
- Exterior features
- Aggregate view

SECTIONS

- Symbols in sections
- Types and categories
- Assembly cross-sections
- Feature checklist

DETAILS

- Use and types of details
- Break line
- Typical scales
- Common details
- Complexity and number
- Below grade construction types

TIMED MODULE ASSESSMENT: 25 QUESTIONS

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COURSE OUTLINE

SAFETY CONSIDERATIONS

INTRODUCTION

- Safety considerations for EAs
- Not a complete safety program!

LADDER SAFETY

- Types of ladders
- Materials
- Stepladder safe use
- Straight ladder safe use

CONSTRUCTION SITE SAFETY

- New Construction
- Renovations
- Hazards to avoid

SAFETY EQUIPMENT

- PPE standards
- Boots
- Head gear
- Eye protection
- Hearing protection

ELECTRIC SHOCK AND FIRE HAZARDS

- Dangers of electricity
- BE SAFE acronym
- Situations to avoid

TIMED MODULE ASSESSMENT: 25 QUESTIONS

NOTE: This is NOT a comprehensive construction safety course. It is specific to the safety considerations issues found in Section 4.1 of NRCan's competency guidelines, and therefore something that might be on your exam.

If you would like more comprehensive safety training, the Alberta Construction Safety Association has a free 9 module online course called Construction Safety Training System (CSTS) The full program takes on average ninety minutes to two hours to complete, and is a nationally, recognized pre-entry requirement for many construction and industry work sites.
Link to Alberta Construction Safety Association Course

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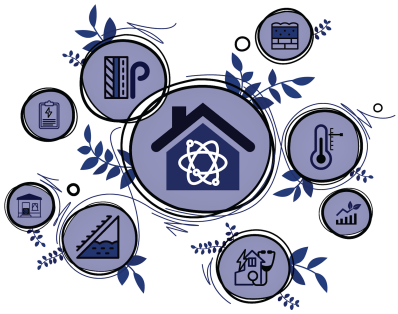
COURSE OUTLINE



BUILDING SCIENCE

Air Flow Mechanisms

THE PRESSURE'S ON!
Air flow mechanisms and pressure differences

- Overview
- Infiltration and exfiltration

THE WIND EFFECT
Pressure from the outside

- Behaviour of wind
- Measuring pressurization

THE STACK EFFECT
Pressure on the inside

- Impact of design and envelope
- Infiltration/Exfiltration

THE COMBUSTION/VENTILATION EFFECT
Pressure can be so exhausting

- Spillage susceptible equipment
- Testing for backdrafting
- Exhaust fans and make up air

DEPRESSURIZATION SUCKS
Pressure differences cause problems

- Combustion spillage
- Radon

Heat Flow Mechanisms

HEAT WAVE
Heat moves in all directions

- 2nd law of thermodynamics
- Heat transfer explained

HEAT FLOW 1: RADIATION
Soak up the heat!

- Greenhouse effect
- Radiant heating delivery systems

HEAT FLOW 2: CONDUCTION
Heat gets physical

- Conductance/conductivity
- Conductive heating delivery systems

HEAT FLOW 3: CONVECTION
The rise and fall of heat transfer

- Molecular agitation
- Convective heating delivery systems

LIVING WITH THE HEAT
How heat flow mechanisms interact

- It's all connected
- Thermal stratification

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COURSE OUTLINE

Moisture Flow Mechanisms

MAKE A SPLASH
Moisture is enemy #1

- Pressure/temperature/gravity
- Why water is Enemy # 1

WATER AND PRESSURE
Gravity can be defied by pressure

- Bulk water leaks
- Capillary action
- Hydrostatic pressure

WATER VAPOUR
Air Flow vs Diffusion

- Humidity (Absolute/Relative)
- Water Vapour
- Vapour Diffusion

MOISTURE-RELATED POLLUTANTS
Some nasty travelling companions

- Condensation
- Mold

Dynamics of Building Science

DYNAMIC TENSION
Reminder: everything is connected

- Building science dynamics overview

THERMAL BRIDGING
Materials that give you the cold shoulder

- Signs of thermal bridging
- Consequences

THERMAL BYPASSES
Sneaky leaks and hidden pathways

- Signs of thermal bypasses
- Consequences

ICE DAMMING
Icicles are not pretty

- How ice dams are formed
- Consequences

SOLAR VAPOUR DRIVE
When moisture pushes back

- How vapour drive happens
- Consequences

ATTIC RAIN
Water on the wrong side of the roof

- How attic rain forms
- Consequences

THE DEW POINT
It's psychrometric, baby!

- Define dew point
- The psychrometric chart

THE NEUTRAL PRESSURE PLANE
What's the over/under?

- Define neutral pressure plane
- Wind pressure differentials
- Air seal to stabilize and control

TIMED MODULE ASSESSMENT: 50 QUESTIONS

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COURSE OUTLINE

CONTROL LAYERS

Control Layers

THE ENVELOPE (FIRST), PLEASE
It's all about control

- Weather resistive barrier
- Air barrier
- Vapour barrier
- Thermal barrier

AIR BARRIERS ARE THE BEST!
Control air flow, solve many problems

- Materials
- Interior
- Exterior
- Consequences of poor continuity

CONTROLLING VAPOUR DIFFUSION
You say barrier, I say diffusion retarder

- Materials
- Positioning of VDR
- Consequences of no VDR/improper placement

WHAT'S THAT LAYER DOING?
Materials with one or more functions

- Characteristics of materials that have multiple functions

THE PERMEABILITY FACTOR
Houses don't have to breathe, they have to DRY

- Managing moisture for durability
- Consequences of a vapour sandwich

CONTROL THE FRESH AIR
Build tight, ventilate right

- Control air flow
- Provide fresh air
- Consequences of no mechanical ventilation

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COURSE OUTLINE

Air Sealing

AIR SEALING THE BUILDING ENVELOPE
The key control factor

- Blower door/thermal imaging
- Start at the foundation, work up
- Control over air movement

AIR SEALING THE FOUNDATION
Stop the stack effect

- Solve for moisture problems first
- Why air seal?
- Neutral pressure plane

AIR SEALING ABOVE GRADE WALLS
Keep those walls tight

- Continuity is key
- Interior or exterior air barrier
- Consequences of material choices

AIR SEALING AT WINDOWS & DOORS
Be a draft dodger

- Seal from interior and exterior
- Consequences of poor sealing

AIR SEALING AT CEILINGS & ROOFS
Batten down the hatches

- Penetrations and top plates
- Avoid ice dams and attic rain

VENTILATE RIGHT
Why we need mechanical ventilation

- Airborne pollutants
- Controlling RH in tighter envelope

Insulation

WARMING UP TO BUILDING SCIENCE
What insulation does

- Heat transfer
- Measuring thermal resistance

GOT ENOUGH FIBRE IN YA?
Fibrous insulation characteristics

- Fibreglass
- Cellulose
- Mineral Wool
- Wood Fibre

FOAM IS IN THE HOUSE
Foam insulation characteristics

- Board (Type I, II, IV, graphene)
- Spray (Low/Med/High density)

TAKING MEASURE OF RESISTANCE
Calculating R-values - YES!!! Math!!!

- R, RSI, U factor
- Nominal vs. effective R-value

ARE YOU IN OR ARE YOU OUT?
Inboard and outboard insulation ratios

- Code requirements
- Consequences

UP, DOWN, IN, OR OUT?
Best insulation applications

- Below Grade
- Above Grade

TIMED MODULE ASSESSMENT: 50 QUESTIONS

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COURSE OUTLINE

THE ENVELOPE FIRST PLEASE!

Windows

WE LOVE/HATE WINDOWS
Windows are the weakest link

- Comfort and glazing choices

ANATOMY OF OPENINGS
The parts of windows, skylights and doors

- Windows and skylights
- Doors

GLAZING OVER IT ALL
Performance characteristics of windows

- Low Emissivity coatings
- Gas fill, spacers and frames
- Vertical Transmittance
- Solar Heat Gain Coefficient
- U-value

WHICH WINDOW WHERE?
Canadian standards and ratings

- Energy Star
- Climate Zone Ratings
- CSA 440 standard

Healthy Indoor Environments

IS IT STUFFY IN HERE?
Defining a healthy indoor environment

- Investigating a house
- Symptoms of poor IAQ

ELIMINATE, VENTILATE, FILTER
How to solve for poor indoor air quality

- Eliminate, Ventilate, Filter
- Testing

WHAT'S LURKING IN THE BASEMENT?
Radon detection and mitigation

- What it is
- Testing and Mitigation

CHOICES AND THEIR CONSEQUENCES
Using healthy materials

- Construction and Envelope
- Finishes

BE A BIG FAN OF FRESH AIR
What is mechanical ventilation?

- Spot Bath/Range
- Whole House HRV/ERV
- How much?

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COURSE OUTLINE

BACKDRAFTING - IT'S NOT GOOD
Depressurization can bring your whole day down

- Why do we care?
- Symptoms you can see or smell
- How to test

High Performance Houses

BEST HOUSES EVER
High performance: here to stay

- 11 Sustainable Programs
- Characteristics of High Performance Construction

HIGH PERFORMANCE BUILDING CODES
No more carrots, just sticks

- National programs and targets
- National Building Code Part 9.36
- BC Energy Step Code
- Tiered Code
- Climate Zone examples

LOCATION LOCATION LOCATION
Climate influences the types of assemblies

- Permeability
- Impermeable assemblies
- Permeable assemblies
- How to calculate dew point

WHAT ABOUT THIS OLD HOUSE?
Retrofitting is all this and more!

- Targets for reductions
- Type, vintage, climate zone
- Hazards

UNINTENDED CONSEQUENCES
How to anticipate and avoid them

- When it goes wrong
- Integrated Design Process (IDP)

WHAT'S COMING UP NEXT?
Preplanning and future proofing

- Preplanning
- Future proofing
- Resiliency

TESTING TESTING, ONE TWO THREE
Commissioning houses is a thing

- Commissioning explained
- Benefits of commissioning

TIMED MODULE ASSESSMENT:
50 QUESTIONS

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COURSE OUTLINE

COMFORT AND ENERGY

Mechanical Systems

SPACE CONDITIONING OVERVIEW
How to keep people comfortable

- How we provide comfort

THE COMFORT GENERATOR, PART 1
Space heating equipment

- Central systems
- Decentralized systems
- Controls

EXHALE THE BAD AIR
Vent types for fuel-fired equipment

- Natural
- Forced
- Condensing

GASPING FOR AIR
Depressurization and make up air

- Depressurization
- Make up air

MOVING THE HEAT AROUND
Space Heating Distribution Systems

- Forced air ducting
- High/low temp hydronic

THE COMFORT GENERATOR, PART 2
Space Cooling Equipment & Distribution

- Window A/C
- Central A/C w/ducting
- Heat pumps

MULTI-TASKING COMFORT
Combination and integrated mechanicals

- Space and water
- Space and ventilation
- Space/water/ventilation

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COURSE OUTLINE

GETTING INTO HOT WATER
Domestic hot water (DWH) systems

- DHW equipment
- DHW energy sources
- DHW distribution

SAVINGS START BEFORE THE FAUCET
Reduce DHW in system design and layout

- Piping choices
- Piping layout for efficiency
- Drain water heat recovery
- Low-flow fixtures

Heat Pumps Are Space Conditioners

THE HEAT TRANSFER PERFORMERS
How heat pumps work

- Heat transfer explained
- Parts of a heat pump

USE THE SPACE CONDITIONER!
Heating, cooling, dehumidification

- Heating
- Cooling
- Dehumidification

WHAT STYLE HEAT PUMP, PART 1
Ways that energy can be transferred

- Air to air
- Air to water
- Water to water
- Water to air

WHAT STYLE HEAT PUMP, PART 2
Energy's transferred, now what?

- Ductless, hybrid
- Central/ducted
- Hydronic tubing or fan coil

AIR SOURCE HEAT PUMPS 101
Use the NRCan guide to select and design

- Define Configuration
- Determine Load Estimates
- Identify and select ASHP
- Define the ASHP Control Strategy
- Define Backup Heating Needs

Measuring Energy

FUEL AND ENERGY
You can't have one without the other

- Fuel Types
- Energy Consumption
- Energy Efficiency ratings

ENERGY EFFICIENCY METRICS
You can't manage what you don't measure

- EUI
- TEDI
- MEUI
- ACH

MEASURING UP COMFORT
Calculate equipment size and system design

- Overview
- F280 Heat loss/heat gain calculation

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COURSE OUTLINE

SUPPLYING FRESH FILTERED AIR
Whole house ventilation: more than HRV

- F326: how to calculate
- Natural air change rate
- Calculating air flow (cfm and L/s)
- Calculating make-up air
- Garbage bag flow test

BILINGUAL MATH
Key conversions for Energy Advisors

- Metric and imperial units
- Insulation values
- Effective R value

Renewable Energy for Houses

THE SUN IN THE SKY
Don't look a gift horse in the mouth!

- The solar cycle

MAKING SOLAR ENERGY USEFUL
Collect, store, and distribute solar gain

- Collect: Windows, greenhouse effect
- Store: Envelope, thermal mass
- Distribute the heat

BE COOL LIKE NATURE
Natural ventilation and shading

- Stack, cross & night ventilation
- Shading: orientation, seasonal

ACTIVE SOLAR HEAT
Water and air solar thermal systems

- Flat Panel or Evacuated Tube
- Open loop or Closed Loop

ON-SITE ENERGY GENERATION
Solar and wind-driven electricity

- Fundamentals of system design

PHOTOVOLTAICS (PV) FOR HOUSES
What makes solar electric hum?

- Cells, panels, balance of system

HOW MUCH PV IS ENOUGH?
How to rough size a PV system

- How to do a rough size calculation

WHAT'S BLOWING IN THE WIND
Turbines, site planning, and rough sizing

- Turbine types
- Site

TIMED MODULE ASSESSMENT:
50 QUESTIONS

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COURSE OUTLINE

BE PREPARED

BE PREPARED
How to study for your exam

- Sequence of questions
- Duration of exam
- When NOT to study

TOP 100 CHALLENGES
Review the key competencies

- Which are crucial?

WE'RE JUST PLAYING WITH YA
Games for memorization

- Jeopardy-based games

EVERYTHING BUT THE KITCHEN SINK
Other study aids

- Review course & transcripts
- Watch these videos
- Do these challenges

DON'T SECOND GUESS!
Multiple choice exam strategies

- Read through
- Easy → hardest
- First thought, best thought

COURSE WRAP UP
You made it! Congratulations

TIMED PRACTICE ASSESSMENT:
150 QUESTIONS