

**RC206**

**Geo Energy Exchange -- Installation**

**3 Credits**

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## RC206 Version: 3



## Geo Energy Exchange -- Installation

### Calendar Description

*Geo Energy Exchange -- Installation* reviews the application of geothermal energy systems. In addition this course introduces the ongoing developments of energy exchange beyond the typical ground source applications. Participants examine energy exchange principles, geothermal heat pump systems, the economic and marketing factors of the energy exchange industry, and the geological factors related to geo-applications. The installation process, maintenance issues, and basic controls are detailed.

### Rationale

Learning to install energy exchange systems keeps you competitive in a market forced to deal with rising energy costs and resource depletion. This course enables you to develop employment opportunities, open new markets, and offer people an environmentally friendly alternative for their space conditioning needs. Besides the training, there is an opportunity to network with others in the energy exchange industry.

This course is designed for energy exchange developers, architects, manufacturers, distributors, dealers, installers, HVAC contractors, plumbers, trenching/drilling contractors, geologists, sustainable or alternative energy practitioners, individuals switching/enhancing employment/business directions/focus, and anyone who desires a working knowledge of this innovative technology, including school graduates seeking to enter the energy exchange world. Representatives from public utilities, private utilities, rural electric cooperatives, business ventures, and real estate can also benefit from training.

This is a required course for the Renewable Energy and Conservation program.

### Prerequisites

RC200 is normally considered to be a prerequisite for taking RC204, RC205 or RC206. The prerequisite may be waived by the department chair if the applicant has prior knowledge of the basic skills related to the subject area. A good basic knowledge of the related principles of electricity, heat, energy movement, energy storage, fluid flow, and the types of calculations commonly used in the related industry are required.

## Co-Requisites

None

## Course Learning Outcomes

Upon successful completion of this course, you will be able to

1. explain the rationale for energy exchange systems.
2. identify the basics of electricity, the principles of refrigeration, and energy exchange principles.
3. assess the importance of energy loads and design loads, energy calculations, and EWT (entering water temperature).
4. examine the elements of the loop system, pumping power, fluid flow rate, pressure drop, manifold design, pressure testing, and fusion.
5. discriminate between diverse drilling methods and grouting procedures.
6. construct a plan for purging, flushing, and conducting a heat pump system start-up and checkout.
7. create a servicing plan.

## Resource Materials

### ***Required Text and Video:***

Dickie, E.J. 2008. Energy Exchange - Geothermal Exchange and Beyond - Design and Installation Guide. 3rd ed. ISBN 978-0-9782997-9-8. Canada.

Available at Lakeland College or [info@deltageothermal.com](mailto:info@deltageothermal.com). Order this book in time to have ready for the beginning of the course. Allow four weeks delivery time.

- Fusion Video - made available to participants during the course by the facilitator

### ***Required Resources:***

- Access to a computer and the Internet.
- Lakeland College D2L orientation - completed prior to start date of course.

### ***If the learner decides to enter the CGC Installers accreditation system, they require:***

- Canadian Standards Association - CAN/CSA-C448 Series-02 (2002). *Design and Installation of Earth Energy Systems*. Available at <http://www.csa-intl.org/onlinestore> (Specify order for CSA-C448 Series-02) or Lakeland College bookstore.
- CGC Installers exam. Available at Canadian GeoExchange Coalition, either ordered through the facilitator or the Dean.

## **Conduct of Course**

This course consists of 45 hours and is delivered as on-line learning. The on-line delivery is a facilitated course, meaning that there is an on-line facilitator who communicates with you mainly by e-mail, phone, and D2L communication tools.

You may be asked to use a number of communication tools during this course. There may be on-line meeting times, depending on the facilitator. These tools allow you to collaborate with your peers interested in energy exchange.

Collaborating with your colleagues provides opportunities to interpret information, to practise effective communication, to use diverse learning methods, to encourage the practice of research, to identify resources, and to find pertinent information. Relating with your colleagues also gives you an opportunity to draw on each other's strengths, specialized skills, and to develop evaluation skills. With some of the activities, you are able to assist others, to enter into problem-solving tasks, to develop work-related strategies such as networking.

As part of your learning sessions, you critically review your assumptions, beliefs, opinions about the geo energy exchange industry, make decisions about your role in this industry, and examine win-win business approaches and solutions.

Besides recognizing the team working with you, you are also working independently, and self-discipline is an important tool that enhances your effectiveness both during the course work and in the business world. Demonstrating growth in the ability to multi-task, being innovative, resourceful, and responding constructively to change and uncertainty increases your chances of success in the energy exchange world.

Demonstrating an honest approach with others, a strong sense of integrity in all your endeavours, and a genuine interest in renewable energy and conservation definitely improves your chances of success in the industry.

You are requested to submit assignments to the facilitator. Assignments are marked by the facilitator and critiqued for positive feedback to students.

## **Evaluation Procedures**

### **Activity Assignments – 70%**

- Module One: In The Beginning - 5%
- Module Two: Foundations - 14%
- Module Three: Ground Source Heat Pump Systems - 8%
- Module Four: Geology - 5%
- Module Five: Fluid Flow Considerations - 6%
- Module Six: Drilling and Grouting - 6%
- Module Seven: Completion and Start-up - 14%
- Module Eight: Maintenance - 12%

**Class participation: Use the online communicative formats to demonstrate your communicative and teamwork skills, your positive attitude, your adaptability to and presentation of new ideas, and critical thinking skills. All these skills are assets for you in the geo energy exchange industry - 5%**

**Module Nine: The Overall Plan - The final is two-fold: project-based and oral presentation - Final 25%**

The performance assessment activities and the summative evaluation have an applicable nature.

Some assignments are also designed as quizzes, the format used for the Canadian GeoExchange Coalition exam. Using quizzes prepares the learner for the CGC exam, should they consider the option of also entering the CGC accreditation program. In addition open book quizzes develop the skills needed to retain information, to document and organize information effectively, and to find information quickly. These skills are also needed on the job.

### **Grade Equivalents and Course Pass Requirements**

*A minimum grade of D (50%) (1.00) is required to pass this course.*

Letter	F	D	D+	C-	C	C+	B-	B	B+	A-	A	A+
Percent Range	0-49	50-52	53-56	57-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-100
Points	0.00	1.00	1.30	1.70	2.00	2.30	2.70	3.00	3.30	3.70	4.00	4.00

**Students must maintain a cumulative grade of C (GPA - Grade Point Average of 2.00) in order to qualify to graduate.**

### **Attendance**

Active participation is required in all courses within the Renewable Energy and Conservation certificate and diploma programs. Each facilitator designates these requirements through the use of tools within the management system and personal contact with learners.

These expectations can be given marks as part of the assessment process. Each course outlines these expectations within the course structure.

For example, learners can be asked to demonstrate their participation/attendance through discussion forums, sharing research results, contributing relevant information, submitting assignments, communicating with colleagues and the facilitator, and participating in synchronous meetings or asynchronous activities.

Attendance is considered vital to the learning process. Absenteeism is recorded. For example, if a discussion forum is organized; the learner is expected to attend as per the guidelines set by the facilitator.

Students can request for an excused absence. An excused absence is one that is verified with your facilitator.

**NOTE:** Any exceptions to the above attendance policy (e.g. family or work-related issues) **must** be approved in writing by the Department Chair **prior** to the beginning of the course.

It is the student's responsibility to know their own absentee record.

## **Course Units/Topics**

Module One: In the Beginning

Module Two: Foundations

Module Three: Ground Source Heat Pump Systems

Module Four: Geology

Module Five: Fluid Flow Considerations

Module Six: Drilling and Grouting

Module Seven: Completion and Start-up

Module Eight: Maintenance

Module Nine: The Overall Plan



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