

CURRICULA FOR GEOTHERMAL HVAC DESIGNERS & DRILLERS COURSE

A. Introduction¹ (2h) -	
8.30	Registration of trainees
9.00	Course opening Alex Aposteanu
9.10	Course overview – Geotrainet Project for training and certification in HVAC GSHP professional specialities Doina Cucueteanu
9.30	Geothermal Renewable Energy Source in Romania Marcel Rosca – Oradea University
10.00	Regulations of “Autoritatea Nationala Apele Romane” in HVAC GSHP applications – Hydrogeological framework ANAR - Departament Autorizari
10.20	Economic and Policy Constraints
10.30	Overview Shallow Geothermal Systems in Romanian applications
10.40	Limiting conditions for HVAC GSHP (Energy sources, Geology, Hydrogeology, Climate , Environmental issues, Regulations, Costs)
10 minutes coffee break (10.50 – 11.00)	

B. Framework for GSHP (1h)		B: General topics (3h)	
11.00	International & Romanian Geological Framework for GSHP	11.00	Shallow geothermal configurations and applications

¹ Designers and drillers together

11.30	International & Romanian Regulatory Framework for GSHP. GSHP Thermal fluids. Ecological aspects.	11.30	Boundary conditions
	C: Feasibility (1h)		
12.00	Concept and Feasibility Study (including investment financial aspects)	12.00	Drilling methods
12.30	Site Investigation and Thermal Response Tests (hydro-geological study, underground water,		
30 minutes snack break (13.00 – 13.30)			
	D: Introduction to Design (2h)		
13.30	Design Fundamentals	13.30	Test drillings for groundwater wells and BHE applications
14.30	The Borehole Heat Exchanger – DDC monitoring (online demonstration)	14.00	Environmental concerns
			C: Specific items for BHE applications (4h)
15.00	Ground Loop Hydraulics	15.00	Performance of test drillings
10 minutes coffee break (15.20 – 15.30)			
	E: Practical & Industry Perspective (2 h)		
15.30	Installation Quality Control: Grouting, Flow and Pressure Testing, Commissioning, System Control, Monitoring and Maintenance	15.30	Performance of TRT - thermal response test Safety aspects
16.30	Drilling Borehole Heat Exchangers in Romania	16.00	Drilling aspects
		17.00	Installation of BHE (monitoring equipment, if required)
17.30 – End of first day of course			

DAY 2			
	F. System Alternatives (1h)		
8.30	Ground Source Heat Pump Industry	8.30	Connection plastic welding; Filling with heat carrier and de-aeration; Functional testing, recommendation of documentation
8.40	System Alternatives		
	G. Integration with the Building (2h)		D: Specific items Open Loop applications (4h)
9.30	Heat Pump Technology	9.30	Geo-documentation from test wells - MWD, geophysical logging Performance of pumping tests, data collection
10.30	Heating and Cooling Loads	10.30	Production wells - types and construction methods Tests after completion
<i>10 minutes coffee break (11.20 – 11.30)</i>			
	H: Closed Loop System Design (2h)		
11.30	Detailed Design, Design Criteria and Ground Loop Sizing	11.30	Well installations - pump, reinjection pipe, monitoring equipment
12.30	Practical Session (software demonstration)	12.30	Over-structure. Mains and fittings; Functional tests of total systems and documents required; Maintenance instructions and service
13.30	<i>30 minutes snack break (13.30 – 14.00)</i>		
14.00	TT²: Technical Tour (2,5h)		
16.30	FD³: Final discussions (1 h)		
	Questions and answers (panel discussions)		
17.30 – End of course			

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- 2. Designers and drillers together
 - 3. Designers and drillers together