

# CITY-SCALE IMPLEMENTATION OF ENERGY GEOSTRUCTURES (CYCLING)

1st Edition | Training School

Engineering Campus of the University of Perugia

21<sup>st</sup>-25<sup>th</sup> March 2022 | Perugia, Italy



A.D. 1308  
**unipg**  
DIPARTIMENTO  
DI INGEGNERIA  
CIVILE E AMBIENTALE

 **Université  
Gustave Eiffel**



**NTNU**

Norwegian University of  
Science and Technology



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## ORGANIZING COMMITTEE

- Jean de SAUVAGE (Université Gustave Eiffel, FR)
- Youssef DIAB (Université Gustave Eiffel, FR)
- Rao Martand SINGH (Norwegian University of Science and Technology, NO)
- Anna Laura PISELLO (University of Perugia, IT)
- Diana SALCIARINI (University of Perugia, IT)
- Anh Minh TANG (Ecole des Ponts Paris Tech, FR)

## INVITED SPEAKERS

- Tony AMIS (Endurant Energy, USA)
- Peter ANDERBERG (Heat Academy International, SE)
- Peter BOURNE-WEBB (Instituto Superior Técnico, PT)
- Yvon DELERABLEE (Terrasol, FR)
- Alberto SALMISTRARO (Eneren, IT)
- Henke WITTE (Groenholland Geo-Energy Systems, NL)

## CONTACTS

All details and information on the Training School will be provided via email or social media through the following contacts.

 [trainingschoolegs.cycling@gmail.com](mailto:trainingschoolegs.cycling@gmail.com)

 @EGS\_Cycling

 @EGS\_Cycling

## GOALS

European energy consumption due to the operation of buildings increases every year and represents 50% of the total. Since the 1980s, the development of Energy Geostructures (EGS) has allowed shallow geothermal energy solutions to be exploited, from the structural concrete elements in contact with the ground (e.g., piles foundations, retaining walls, tunnels, etc.) by integrating heat exchanger pipes into them. Since urban areas have been recognized as the heart of the decarbonization process, urban solutions for our future energy needs are necessary for the transition to more sustainable cities.

## TRAINING SCHOOL

This training school is the first edition of the series “City-scale implementation of Energy Geostructures” and was conceived with the aim of training MSc, PhD and Professionals in order to provide a comprehensive knowledge and new skills, integrating different topics and typical contents in the framework of: renewable heating/cooling energy, infrastructure, architecture, urban planning, energy geotechnics/geology, energy policies and financing.

## ACTIVITIES

How to design EGS from the Thermo-Mechanical behavior of soils to the implementation at the city scale? How to involve the Stakeholders? How to connect EGS to the City Networks? How to hybridize EGS with other Renewables? What are the Energy Policies? How to finance Renewable Heating/Cooling? To try to answer these questions and provide a contribution with respect to the above-mentioned issues, the training school's activity is proposed with a multi-approach. The following complementary activities are foreseen:

- **Frontal Lessons:** participants will have the opportunity to follow some lectures and seminars proposed by Invited Speakers from industry and academia.
- **Group Works:** some hours will be dedicated to group works and selected topics will be assigned to be developed synergistically among the participants.

- **Technical Site Visit:** guided tour at Sant'Apollinare Fortress, which is the first building certified under the GBC Historic Buildings sustainability protocol (details at <https://geofit-project.eu/pilots/perugia/>).



Cycling school Lecture room (Aula Magna) at UNIPG Engineering Campus

# PROGRAM

## Monday 21<sup>st</sup> March – Day 1

14:30	Welcome, Institutional Greetings, and Brief Introduction of the Training School
15:30	Self-presentation of the attendees
16:15	<i>Tea/Coffee break</i>
16:30	Presentation of the Topics/Projects and Working Groups
17:30	Presentation of the Topics/Projects and Working Groups
19:30	<i>Ice-breaking Pizza</i>

## Tuesday 22<sup>nd</sup> March – Day 2

9:00	Rao Martand Singh. Introduction to EGS
10:00	Anh Minh Tang. Basics of soil Thermal-Hydro-Mechanical behavior
10:45	<i>Tea/Coffee break</i>
11:00	Peter Bourne-Webb. Energy pile research and implications for design - 1
12:00	Peter Bourne-Webb. Energy pile research and implications for design - 2
13:00	<i>Lunch Break</i>
14:30	Parallel sessions of Working Groups
15:30	Parallel sessions of Working Groups
16:15	<i>Tea/Coffee break</i>
16:30	Diana Salciarini. Combining energy and structural retrofitting
17:30	Youssef Diab. City scale implementation of EGS

## Wednesday, 23<sup>rd</sup> March

9:00	Site visit – Sant' Apollinare Fortress
10:00	Site visit – Sant' Apollinare Fortress
11:00	Site visit – Sant' Apollinare Fortress
12:00	Site visit – Sant' Apollinare Fortress
13:00	<i>Lunch Break</i>
14:30	Henk Witte. Planning and integrated design of large-scale individual borehole heat exchangers systems – 1
15:30	Henk Witte. Planning and integrated design of large-scale individual borehole heat exchangers systems – 2
16:15	<i>Tea/Coffee break</i>
16:30	Tony Amis. Practical Construction Aspects of Designing Installing and Operating a GSHP Solution Connected to Energy Foundations – 1
17:30	Tony Amis. Practical Construction Aspects of Designing Installing and Operating a GSHP Solution Connected to Energy Foundations – 2

### Thursday, 24<sup>th</sup> March

9:00	Anna Laura Pisello. Integration of renewables in historical context
10:00	Anna Laura Pisello. Environmental comfort and Human centric design in urban areas
11:00	Yvon Delerablée. Hydro-thermal interactions – 1
12:00	Yvon Delerablée. Hydro-thermal interactions – 2
13:00	<i>Lunch Break</i>
14:30	Peter Anderberg. Stakeholder Involvement – Securing buy-in for decarbonisation projects
15:30	Peter Anderberg. Stakeholder Involvement – Securing buy-in for decarbonisation projects
16:15	<i>Tea/Coffee break</i>
16:30	Parallel sessions of Working Groups
17:30	Parallel sessions of Working Groups
19:30	<i>Gala Dinner</i>

### Friday, 25<sup>th</sup> March

9:00	Alberto Salmistraro. The energy geostructures, case study at the University of Rome
10:00	Realizations and examples
10:45	<i>Tea/Coffee break</i>
11:00	Presentations of the results of the Working Groups
12:00	Closing round table

## HOW TO REGISTER

Registration can be done sending an email to: [trainingschoolegs.cycling@gmail.com](mailto:trainingschoolegs.cycling@gmail.com), including a short resume. The course has a maximum limit of 30 participants and the deadline to register is 14.03.2022. The School will be with face-to-face lessons. ECTS certification will be issued to the Attendees.

The training school is fully funded by iSite FUTURE (<http://www.future-isite.fr>) and it covers registration fees, site visits, coffees, lunches and gala dinner. Travel and accommodation expenses are excluded.

## COVID-19 PROTOCOL

We are closely monitoring the COVID-19 situation. At this point, access to the Training School venues is possible only with the **SUPER GREEN PASS**. It is also mandatory to wear an **FFP2 mask** in all places of the school and for its entire duration. The aforementioned provisions are to be considered consistent with current legislation on the COVID-19 emergency. Possible changes in these precautions will be communicated to the Attendees ahead of time.

## PLACES

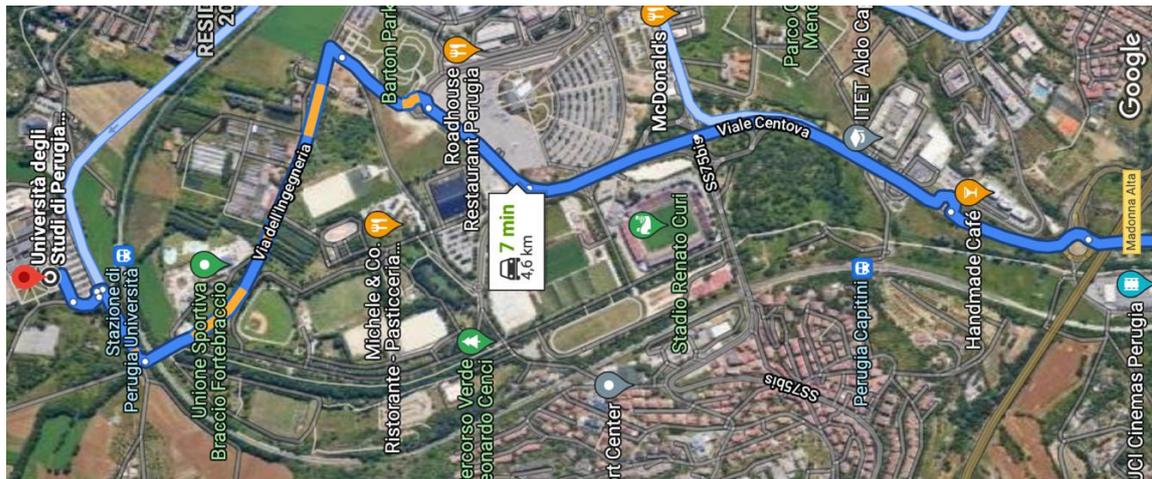
The Lecture room "Aula Magna" of the Engineering Campus of the University of Perugia will host all the sessions of the course. The entertainment activities of the Training School will take place in the City center and in the green district of "Madonna Alta". The site-visit will be reached by bus.

Reference addresses for lessons and external activities:

- Engineering Campus of University of Perugia  
*Via G. Duranti 93, 06125 Perugia, Italy*
- Pizzeria Capri  
*Corso Cavour 28, 06121 Perugia, Italy*
- Sant' Apollinare Fortress  
*Vocabolo Monte Pugliano, 0605, Marsciano, Italy*
- Bisbò Dimora del Gusto  
*Viale Giovanni Perari 13, 06125, Perugia, Italy*

# HOW TO GET

By car: Take the Perugia-Bettole Raccordo and exit at "Madonna Alta", at the roundabout take the Viale Centova road and continue until you turn left into Via dell'Ingegneria. After the underpass, take the first exit for Via Goffredo Duranti. The Engineering Campus will be shortly after on the right. A large free car park is located right next to the buildings of the Engineering Department buildings.



By public transportation: there are three available solutions (details on [https://moovitapp.com/index/it/mezzi\\_pubblici-Facolt%C3%A0\\_Di\\_Ingegneria-Perugia\\_e\\_Umbria-site\\_15632490-4062](https://moovitapp.com/index/it/mezzi_pubblici-Facolt%C3%A0_Di_Ingegneria-Perugia_e_Umbria-site_15632490-4062)):



- Train lines (R, RV) with stop "Stazione di Perugia Università"
- Bus lines (A, F, G, P, Q, S)
- MiniMetro line (Pian di Massiano)

## WHERE TO STAY

*Sangallo Palace* ★★★★★

Via Masi 9, 06121 Perugia, Italia – hotel@sangallo.it / +39 075 5730202

*Hotel Giò Wine e Jazz Area* ★★★★★

Via R. D'Andreotto 19, 06124 Perugia, Italia – reception@hotelgio.it / +39 075 57731100

*Hotel la rosetta* ★★★★★

Piazza Italia 19, 06121 Perugia, Italia – info@hotelarosetta.it / +39 0755720841

*Primavera Mini Hotel* ★★★

Via Vincioli 8, 06123 Perugia, Italia – +39 075 572 1657

*Hotel Fortuna* ★★★

Via Luigi Bonazzi 19, 06123 Perugia, Italia – fortuna@umbriahotels.com / +39 075 5722845

(\*all these hotels are in the City center)



Pic by: @alessandro\_polidori



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